



**University
of Basel**

Faculty of
Psychology



PERSONALITY FACTORS AND CASTE AFFILIATION IN THE EDUCATION OF INDIAN ADOLESCENTS

Inaugural dissertation to obtain the dignity of the Doctor of philosophy submitted to the Faculty of Psychology of the University of Basel

Roshin Kunnel John

From Alleppey, India

Basel, 2019

Original document stored on the publication server of the University of Basel <http://edoc.unibas.ch>

Approved by the Faculty of Psychology at the request of

Prof. Dr. Jana Nikitin (in chair)

Prof. Dr. Jens Gaab (Referee)

Prof. Dr. Andrew Gloster (Co-Referee)

Date of the doctorate exam: 2020/02/28

Prof.Dr. Alexander Grob:

Dean of the Faculty of Psychology

Explanation of scientific integrity

I hereby declare that the present work was written independently without the help of third parties and without the use of aids other than those specified. Helped sources are identified as such. The manuscripts published or published for publication in journals have been prepared in collaboration with the co-authors and have not been published elsewhere by any of the participants, submitted for publication, or submitted to any other examining authority as a qualification paper. These are the following manuscripts:

- Kunnel John R, Xavier B, Waldmeier A, Meyer A and Gaab J (2019) Psychometric Evaluation of the BFI-10 and the NEO-FFI-3 in Indian Adolescents. *Frontiers in Psychology*, 10, 1057. <https://doi.org/10.3389/fpsyg.2019.01057>
- Thaiparambil, B. X., Waldmeier, A., John, R. K., Phil, M., & Gaab, J. (2018). Importance and impediments of education in India: Proposition of a merit-based and social-stratification insensitive approach. *Journal of Education and Social Sciences*, 6(2), 195-203. <https://www.researchgate.net/316036390>
- Kunnel John R, Xavier B, Waldmeier A, Meyer A and Gaab J (2019) The Governmental Ranking of Class and the Academic Performance of Indian Adolescents (submitted in: PLOS ONE)

Basel, 12.12.2019.

Roshin Kunnel John

Acknowledgement

I would like to acknowledge all who have contributed significantly in the process of making this doctoral thesis possible.

First and foremost, my sincere thanks to my supervisor Prof. Dr. Jens Gaab, who guided and supported me throughout my dissertation years. His inspiring inputs and encouragement motivated me to think differently and progress as a scientist and researcher as well as learn a lot as a psychotherapist. My special thanks to Prof. Dr. Jana Nikitin and Prof. Dr. Andrew Gloster for their valuable support to make this dissertation successful. Special gratitude to Dr. Andrea Meyer for his timely support for the statistical work. Also, special thanks to Dr. Rajeev Michael who helped me throughout my study. I gratefully remember and acknowledge the contribution of the other team members of this project Dr. Boby Thaiparambil, Anja Waldmeier and Sunsha and all the participants in India and their school authorities.

I would like to thank the entire team of the division of clinical psychology and psychotherapy with whom we share and exchange our scientific progress and learning experiences every week in a very friendly environment of the team meeting under the leadership of Jens. Special thanks to Dr. Cosima Locher, Marnie Reed, and Linda Kost for their valuable time and support for my first article. Also, thanks to Antje Frey Nascimento, Nadja Heimgartner, Dr. Helen Koechlin, Emma Jones, Sarah Bürgler, Karin Hediger, Cora Wagner, Dilan Sezer, Marc Inderbinen, Bojana Degen and all others in the team for the friendly support and being together as a good team. Very specially, I thank Katharina Stieger from the administrative office, Phillippe Chresta from IT and his team for their valuable support.

My special thanks to the sisters in 'Schwesterengemeinschaft Bethesda' Basel, very specially to my dear Sr. Elisabeth Meier who always stood beside me like my mother. Also, to Sr. Ann Xavier and all my communities in Germany and Rome for their love and sisterly care. I would remember all my friends and families from Switzerland (very specially Basel and Bern), Germany, Italy, Vienna, Slovakia Croatia, U.K, U.S.A and India who all were very strong support during my stay in Basel.

With gratitude and due respect, I remember my religious family: Sisters of the Visitation Congregation of Alleppey, the formal Superior generals; Mother Mary Caroline, Mother Leela Jose and their council team for their trust and confidence in me and the present team Mother Tresa Charles and her councilors; Sr. Rose Xavier, Mary Benedict, Dolly Manuel and Sr. Delima John for continuing the same support and acknowledging my determination.

Special thanks to Rev. Bishop Chacko Thottumarickal, the Bishop of Indore who acknowledged my services in Indore and found sponsors for my Ph.D. study and the goodwill of my sponsors from Dioezese Rottenburg-Stuttgart, Bishop, directors, and sisters for their financial support.

Finally, trusting in the providence of the almighty, I remember my parents (Mr. John Kunnel Joseph & Mrs. Mary Kunnel John) with lots of love and gratitude who taught me the values of life and continue to be my source of inspiration and encouragement. I gratefully remember my sisters and their families who always encouraged me and consider my success as their happiness.

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Abstract

Facilitating human development through education is deemed as a major task of modern welfare states. In view of this, it is important to assess and evaluate predictors of academic performance with the aim of planning a suitable educational system, supporting and fostering known predictors. This is especially relevant for India's unique context of caste system, and regional-linguistic differences.

The emphasis of this dissertation is two-fold. As personality is a known predictor of academic performances, we first set out to assess the psychometric relevance and applicability of the five-factor model of personality which is acclaimed as universally applicable. To achieve this, two independent studies were conducted with the aim of psychometric evaluation of two widely used measures (BFI-10 and NEO-FFI-3) and both studies examined two socio-culturally distinct linguistic groups of Indian adolescent school students (N=1117). Secondly, we set out to examine adolescent education in the context of India's complex fabric of social stratification, especially the governmental ranking of class, viz., scheduled castes/tribes (SC-ST), other backward classes (OBC) and general class (GC). This was done through two studies: 1) a detailed review study on the role of social stratification on education of Indian adolescents; and 2) a study on the impact of the three governmental classes on the academic performance of Indian adolescents (N=858) from the same school environment, while controlling for family income, age and gender, as well as self-esteem and life satisfaction.

The twin studies of psychometric evaluation provided very limited support for a five-factor solution for the two measures, pointing to potential influence of socio-cultural factors on the personality consolidation of Indian adolescents. The review study found that social stratification as well as caste-based reservation is a severe impediment for education in India. The third study found a positive relationship between the governmental class and academic performance of adolescent students, wherein higher level of class predicted better academic performance, when controlled for family income, self-esteem and life satisfaction.

These findings point to the urgent need for further research on the predictors of education of Indian adolescents as well as strategic action to eliminate the impact of caste affiliation on their education.

1. Introduction

India is unique in its rich as well as complex ethnic and cultural diversity. Human resource development in India is set in the socio-cultural context of the caste system and ethnic-religious and regional-linguistic differences across the population. The seven-decade old nation retains a diversity of over 10,000 distinct ethnic communities (Fearon, 2003; Roy, 2011), and 1'369 languages (Census of India, 2011). The Indian 'societies' have been described as predominantly collectivistic and interdependent (Sinha, 2001) and hence socio-culturally distinct from the Western societies. The complex social fabric of casteist, religious, and regional diversities and hierarchies is the inevitable context for any investigation about the Indian adolescents as well as India's educational system, and to foster predictors of human development.

Adolescent personality development in the predominantly collectivistic and interdependent Indian societies is likely to follow a trajectory different from that of the individualistic and personal agency based European-American societies (Chadda & Deb, 2013; Schwartz, 2012). Collectivistic Indian families foster social cohesion, role conformity and interdependence in children rather than self-direction and personal choice (Arulsubila, 2016; Chadda & Deb, 2013; Savita, 2014). The development of identity and personality in adolescence is likely to follow a maturity principle wherein freedom and perceived autonomy facilitate seeking out social contexts that are conducive for building up the dispositional attributes of the adolescent (Caspi, Roberts, & Shiner, 2005). Hence, in India, personality consolidation in terms of developmental years may not be identical to that of the individualistic Western societies.

The Indian education system has a long tradition, which dates back to the Gurukula tradition and which was limited to the higher social strata of the society and was primarily focused on learning the Sanskrit language and matters of religion. However, its current form is framed after the model of European education system (Verma, 2017). From the colonial days, English language gained importance along with other languages and became, in the contemporary India, the single most important factor in higher education. At present, education is being governed by both central and the state boards in a parallel fashion. While India is considered a fast-developing country despite its efforts to improve the education system, progress is still lagging due to a number of facts like poor infrastructure, poor quality of teachers and lack of financial resources.

Although the Indian constitution of 1950 eradicated the caste system, inequalities based on caste by birth has continued to hinder the national development (Naorem, 2013; Desai, 2010). With the aim of uplifting the disadvantaged groups, the government of India has grouped the traditional caste system into three classes, i.e., General Class (GC), Other Backward Classes (OBC) and Scheduled Castes/Scheduled Tribes (SC/ST). But although these governmental classes are thought to replace castes and thus to eradicate caste-related discrimination, they still represent basically the caste system, since class assignment is based on sub-caste affiliation, as opposed to individual socioeconomic status (Jodhka, Boatcă, & Treitler, 2015; Zwart, 2000).

The social and economic factors are commonly examined as contextual variables that predict academic achievement, apart from the educational environment. In India, a major segment of the socioeconomic status of students comprises the governmental class, which is only a disguised representation of caste system. Hence, it is important to examine whether and to what extent social stratification in terms of class-caste affiliation determines academic performance.

The studies presented in this dissertation have been conducted on two socio-culturally distinct and geographically distant linguistic groups of adolescents from two Indian states: Madhya Pradesh from North India and Kerala from South India. Kerala ranks as one of the best among Indian states on social developmental and quality of life indicators, whereas Madhya Pradesh stands slightly below the average rates for India (Census of India, 2011). Kerala has the highest literacy rate (94%) among Indian states, much higher than Madhya Pradesh (70%) and the national literacy rate (74%). Kerala boasts of equal educational opportunity for male and female children as compared to the other Indian states including Madhya Pradesh where females lag behind. Kerala also has the highest life-expectancy and infant mortality rates, while Madhya Pradesh is close to India's average rates (Census of India, 2011). Keralites speak Malayalam as their mother tongue whereas the mother tongue of Madhya Pradesh is Hindi which is India's most common language. Hence, we took utmost care to incorporate cultural diversity of the adolescent school students who were examined in the studies discussed below. Thus, in each of the studies discussed below, we developed and employed native translations of the measures, and included self-report of religion and caste affiliation as well as school records of the governmental class stratification of the adolescent participants.

1.Theoretical Background

1.1. Big-Five Personality Factors in Indian Adolescents

In view of facilitating human development through education, it is important to assess and evaluate predictors of academic performance for the purpose of fostering a suitable educational system. Personality is a known predictor of academic performances. The scientific examination of personality is driven by the aim of identifying and predicting patterns of individuals' thinking, feeling and behaving based on the assumption that these patterns are relatively stable and universal amid socio-cultural diversities. Extensive cross-cultural research in the last three decades has come to establish the Five-Factor Model (FFM) of personality, often referred to as the Big Five with its domains Neuroticism, Extraversion, Openness to experience, Agreeableness, and Conscientiousness (Denissen, Geenen, van Aken, Gosling, & Potter, 2008; Goldberg, 1993; John, 1992; Paul T. Costa, 1995). Research on the FFM has led to the development and modifications of two broad sets of measures, i.e., the Big Five Inventories (BFI-44, BFI-10 and BFI-2) and the NEO Inventories (NEO-PI, NEO-PI-R, NEO-FFI, NEO-PI-3 and NEO-FFI-3). The two most commonly used NEO inventories are the Revised NEO Personality Inventory (NEO-PI-R) and the NEO-Five-Factor Inventory (NEO-FFI) developed by Costa and McCrae (1992). The NEO-FFI-3 (McCrae & Costa, 2007), which is a revision of the NEO-FFI aimed at better readability especially for respondents who are not native English speakers. Across studies, good Cronbach's alpha reliability has been demonstrated for its subscales (Marjanovic, Holden, Struthers, Cribbie, & Greenglass, 2015; McCrae & Costa, 2007). Furthermore, and independent of the NEO Inventories, the Big Five Inventory-44 (BFI-44) was developed as a time-efficient measure of the FFM (John et al., 1991; Soto and John, 2009). The BFI-44 has been translated into 28 languages and its structure has been replicated in 56 nations (Schmitt et al., 2007). The pursuit of brevity resulted in the BFI-10 (Rammstedt and John 2007), which consists of just two items to represent each of the five core personality dimensions. Brief as it is, the BFI-10 offers an efficient assessment and has been validated in the USA and Germany in the respective languages (Rammstedt and John,

2007; Rammstedt et al., 2013). The Next Big Five Inventory (BFI-2) is a new 60 item measure of the five-factors (Soto and John, 2017).

The diverse FFM measures have gathered a strong evidence base in the Western societies where they originated (Costa and McCrae, 1997; Goldberg, 1993; McCrae and Costa, 2010) and their psychometric qualities were reproduced in a number of cross-cultural studies incorporating different societies on most continents (McCrae et al., 2005; Schmitt et al., 2007; see also Allik and Realo, 2017). However, a few studies could not replicate the five-factor structure in non-Western societies (e.g., Cheung et al., 2011; Gurven et al., 2013; Zecca et al., 2013). Gurven and colleagues (2013) argued that, even in cross-cultural studies the participation was often limited to the educated urban population and that the FFM is yet to have evidence for indigenous and often illiterate societies (Gurven et al. 2013). Besides, these cross-cultural studies have observed small variances from the U.S. normative data in the developing countries (McCrae et al., 2005; Schmitt et al., 2007). FFM studies in Europe and the US have demonstrated the five-factor structure in adolescents with the lowest age cut-off of 12 years in the normative data for the Big Five as well as the NEO inventories (Costa et al., 2000; Klimstra et al., 2009; McCrae and Costa, 2004; McCrae et al., 2002; O'Connor et al., 2007). However, it has been observed that adolescents below 16 years of age are likely to provide a relatively lower quality of the self-reported personality trait structure (Allik and Realo, 2017).

With respect to the FFM research in India, so far, around 35 published studies have employed either the NEO inventories or the Big Five inventories in the Indian context. However, most of these studies were conducted on adults and college students, and none of these studies have reported the psychometric values of the FFM measures on adolescent school students. The NEO Inventories were used in 21 out of the 35 FFM studies. Of these, three studies addressed psychometric evaluation of the NEO inventories. Lodhi et al. (2002) and Singh (2009) examined NEO-PI-R, and Piedmond and Braganza (2015) studied NEO-PI-3. Whereas Singh (2009) studied young adults in the age range of 18-25 years, the other two studies were conducted on adult samples in the age range of 18-60 years. All the three studies found acceptable alpha reliability values ranging from 0.73 to 0.93 for the five-factors, and the factor structures were replicated. However, it was found that the scores for factors Extraversion and Agreeableness aligned differently from the pattern in the U.S. normative data. Four FFM studies in which the NEO-FFI was used with adults, reported acceptable alpha reliability values ranging from 0.63 to 0.88 (Dabke, 2014; Dubey et al., 2010; Madnawat and Mehta, 2012; Magan et al., 2014). However, in a study on postgraduate students, Joshi and Thingujam (2009) reported inadequate alpha reliability values for the NEO-FFI. The obtained psychometric values of the FFM measures are not mentioned in the other studies including 12 studies which administered the NEO-FFI/NEO-PI-R on college students or working youth of 18-30 years of age (Abbas and Khan, 2018; Chaturvedula and Joseph, 2007; Fazeli, 2012; Gupta, 2017; Mandal, 2017; Pavitra et al., 2007; Rita, 2017; Sharma and Gill, 2016; Sharma et al., 2010; Srivastava and Mishra, 2016; Sushma et al., 2015; Ullah, 2017). Singh and Ullah (2016) used NEO-PI-R with adolescent school students, but did not mention the obtained alpha reliability values.

Unlike the NEO inventories, there are no published Indian studies on the psychometric evaluation of any version of the BFI. The Big Five Inventories were used in 14 out of the 35 FFM studies. In 8 of them, the BFI-44 were administered with working youth or college students (Aggarwal et al., 2014; Andi, 2012; Joshi

and Bhardwaj 2016; Parekh, 2018; Patki and Abhyankar, 2016; Saini et al., 2016 Subrahmanian et al., 2012; Thurackal et al., 2016), and in two other studies of young adults the BFI-10 was used (Mahajan et al., 2017; Varghese and Raj 2014). There were also two studies in which the BFI-44 was used with school students (Kumari and Sharma, 2016; Salve et al., 2017). Unfortunately, none of these 12 studies mentioned the obtained psychometric values of the BFI-44 or BFI-10. In the international cross-cultural study of Schmitt et al. (2007) 100 Indian college students were included. However, separate scores for the Indian subgroup are not mentioned in the study. Finally, Singh and Yu (2010) who reported the obtained alpha reliability values of the BFI-44, which was administered on college students aged 18-27 years, found that none of the five-factors had acceptable alpha reliability.

Thus, no study has yet reported the psychometric values of NEO-FFI-3 and BFI-10 in India and no study has yet examined the applicability of the FFM for the Indian adolescents. Unfortunately, the few published studies (e.g., Kumari and Sharma, 2016; Singh and Ulla, 2016) in which FFM measures were administered on Indian adolescent school students, do not report the psychometric values. Though the applicability of FFM measures for Indian adults have been demonstrated in some studies, a few studies raise questions. Besides, establishing the applicability of the measures on adults does not automatically make them reliable and valid for the adolescents. Hence, it is crucial to replicate the five-factor structure on school-going Indian adolescents in the age group of 12-17 years, and to examine the utility of time-effective FFM measures for this age-group in the Indian context.

1.2. Caste affiliation and educational system in India

The Indian caste system can be defined as a system of social stratification, which divides the society into groups based on its members occupations and is closely associated with Hinduism (Berreman, 1972; Singh, 2009). The major differences between caste and class are that the membership in the caste is given by birth and that caste is a closed group characterized by endogamy whereas class is an open group. Also, in the class system vertical mobility is possible, such as a person can move higher and go down, whereas in caste there is no such mobility. Finally, a given class can be distinguished from another class on the basis of economic criteria such as income, occupation whereas caste is based on religious and mythical traditions and may have hereditary and traditional occupation (Laskar, 2010). But although the governmental classes are thought to replace castes and in consequence to eradicate caste-related discrimination, classes still represent basically the caste system, since class assignment is based on sub-caste affiliation instead of individual socio-economic status (De Zwart, 2000). Thus, in the system of the governmental class, so-called untouchables (Dalits) are assigned to SC/ST, other socio-economically unprivileged castes, such as shudras are grouped into OBC (De Zwart, 2000) while members of the highest caste being assigned to General or Forward class (Chauhan, 2008). The OBC and General Class are assigned on the basis of socio-economical and educational criteria from Hindu religion and the groups in other religions are also assigned to these classes. Accordingly, the Mandal Report noted that "in the traditional Indian society social backwardness was a direct consequence of caste status" (Government of India, 1980 p.22, as cited in De Zwart, 2000).

Historically, caste affiliation determined the legal rights and obligations as well as secured the power of caste system to make rules for itself and constitute tribunals to enforce these rules, without being controlled by the government. However, the 1950 constitution of India put forward a new order with regard to

castes in Indian society and the role of law for regulating it by personal law with law of uniform civil code, which assures equality in the society and made enforcement of inequalities a crime, punishable by imprisonment or fine. Although the Indian constitution of 1950 eradicated the caste system, inequalities based on caste by birth has continued to hinder the national development (Desai et al., 2010, Ramachandran and Naorem, 2013). Although the right to free and compulsory education for all children aged under 14 years is constitutionally guaranteed and was strongly advocated in the Right to Education Act (Ministry of Human Resource Development, Government of India, 2009, 2014), substantial inequality in education and employment still exists and family income is strongly influenced by caste and ethnicity (Desai and Kulkarni 2008). Students belonging to low-castes are exposed to various forms of daily humiliation, exploitation and exclusion in the schools (Jalki and Pathan, 2017; Ramachandran and Naorem, 2013; Thorat and Newman, 2007).

In consequence and in order to reduce inequality in Indian society, the Government of India introduced counteracting or alleviating policies, such as the reservation system. Being basically a quota-based affirmative action, the objective of the Indian reservation system is to uplift social and educational opportunities for underprivileged communities. But although governmental policies set out to reduce the inequality and discrimination by reservation, it did not fully meet its incentive (Mili, 2016). For example, The Times of India (2014) pointed out that only 10% of eligible students have access to higher education in India and that the poor and deprived are still trapped in low quality of education. Also, according to the UNICEF report, lowest-caste children in India experience severe discrimination in education; which in turn has negative impacts on self-esteem and academic performance (Nambissan, 2009). Accordingly, the India Exclusion Report (2013-2014) states that “children who spend a greater part of the day in school, experience discrimination, neglect, active biases and prejudices, and ill-treatment from teachers and peers, (which) often results in a decision to drop out or frequently absent themselves from the schools” (India Exclusion Report 2013-2014) and a study conducted in Karnataka, south India on low class female students shows that they often face exclusion on the bases of caste and their poor academic performance (Bhagavathe Eswaran et al 2016). Thus, we argue that attempts to enhance the development of education in India is substantially impeded by the detrimental effect of caste and social stratification. Hence, the attempts to shelter its students from these influences would substantially enhance schooling quality. Therefore, it is important to examine the current scenario of Indian education system in the light of the caste and class stratification and to generate alternative pathways to handle their impeding effects on education.

1.3. Governmental Class and Academic Performance in Indian Adolescents

The impact of socioeconomic status on educational outcomes is an important concern in educational research (Sirin, 2005; Thomson, 2018; White, 1982). Studies have consistently shown that socioeconomic status of parents as well as family distress significantly influences student's overall academic achievement (Ahmar and Anwar 2013; Sajjad et al., 2012). Sirin (2005) conducted a meta-analysis of studies on the relationship between academic achievement and socioeconomic status, and included 74 independent studies comprising 101157 students and 6871 schools. A strong positive relation was found between socioeconomic status and academic achievement. School location and social status as minority were found to be the major influences on this positive relation. In the Indian context, caste affiliation along with the financial condition of the family constitutes a major part of students' socioeconomic background. In fact,

caste affiliation may determine to some extent the socioeconomic status of the family (Adsul et al., 2008; Sirin, 2005; White, 1982). Alternately, the associated socio-economic status may determine academic achievement, irrespective of caste/class affiliation.

A few Indian studies have examined the role of caste status on academic achievement (e.g., Kamat, 2008 May; Sekhri, 2010 Oct; Surendrakumar Bagde, 2015). Yadav and Chahal (Chahal, 2016) observed that there was no significant difference of academic achievement between high and low caste students of secondary school. Sinha and Mishra (Mishra, 2014) observed that social class-based identities especially linked to parental education did not determine academic achievement of Indian students. However, other studies observed that educational and occupational status of parents influence their academic achievement (e.g.) (Chopra, 1967 April; Dr. Sunita Singh, 2016). Whereas (Sekhri, 2010 Oct) found that integrated college environment of higher and lower castes was unhelpful for academic achievement of both groups, Bagde et al (Surendrakumar Bagde, 2015 Dec) affirm that studying together did not have a negative impact on academic performance.

Also, self-esteem and life satisfaction have been found to impact academic performance (Daraei & Mohajery, 2012; Fors Connolly & Johansson Sevä, 2018; Rahmani, 2011; Rosli et al., 2012). There is evidence for a reciprocal association between self-esteem and academic achievement (Alves-Martins, Peixoto, Gouveia-Pereira, Amaral, & Pedro, 2002) as well as life satisfaction and academic achievement (Ng, S, & K, 2015). Though Indian studies have examined self-esteem and life satisfaction in the context of educational outcomes, there is a lack of research linking these variables to the governmental stratification of the three classes in the context of academic performance. Besides, the association between academic performance of Indian adolescent students and their governmental class has not been examined in any published Indian study.

We hypothesized a positive association between governmental class and academic performance in Indian school students when controlling for demographic variables such as family income, gender, and age, and psychological variables of self-esteem and life satisfaction.

2. Aims of the Thesis

The aims of this dissertation were two-fold. The first was to examine the applicability and psychometric relevance of the five-factor model of personality for Indian adolescent school students by examining two widely used measures: BFI-10 and NEO-FFI-3. It was planned to replicate the five-factor structure on students in the age group of 15–18 years in two independent and multisite studies in the Indian context. The second aim was to explore the influence of India's complex social stratification on education. In view of this, a review study was designed to explore the influence of caste affiliation on education, the impact of the governmental-class-based system of reservation on education, and the relative advantage of a merit-based system versus the quota system. Furthermore, a cross-sectional study was carried out to investigate the association of the governmental class with the academic performance of Indian adolescents (N=858) who enjoy the same school environment. It was also planned to investigate whether the hierarchy of the governmental class (i.e., general class (GC) at the higher level, other backward classes (OBC) at the mid-level, and scheduled castes/tribes (SC-ST) at the lower level of social status), positively predicted academic performance when controlling for demographic variables such as family income, age and gender, and the psychological variables of self-esteem and life satisfaction.

3.Methods

3.1. Psychometric Evaluation of the BFI-10 and the NEO-FFI-3 in Indian Adolescents

Single-group cross-sectional designs were used for the psychometric evaluation of the BFI-10 and the NEO-FFI-3 personality inventories in two separate studies on two independent groups of adolescent school students.

Participants:BFI-10 study was conducted on a sample of 679 students and the NEO-FFI-3 study on 438 students. For both studies, participants were in the age range of 15–18 years. Both studies had linguistic subgroups with reference to the two States where the studies were done, i.e., Kerala in South India and Madhya Pradesh in North India. Details of the demographic information on the two studies are given in Table 1.

Measures:For the BFI-10 study, we used the 10-item short-version of the Big Five Inventory (BFI-10, Rammstedt and John, 2007). The BFI-10 has five subscales with two bidirectional items for each of the big-five personality factors. The items are rated on a five-point Likert scale wherein the subjects choose from responses ranging from 'strongly disagree to strongly agree'. For the NEO-FFI-3 study, we used the NEO-FFI-3 form S - Adolescent, Self-Report which consists of 60 items, with 12 items each for of the big-five personality factors (McCrae and Costa, 2010). The NEO-FFI-3 is a revision of the NEO-FFI (Costa and McCrae, 1992) in which 15 of the 60 items have been revised to improve readability and psychometric properties. The measure uses a five-point Likert scale of responses ranging from 'strongly disagree to strongly agree'.

Procedure:For both the BFI-10 and the NEO-FFI-3 measures, translated versions of Hindi and Malayalam were used. The research project was submitted to the Cantonal Ethics Committee (Basel-Stadt and Basel-Land), which positively acknowledged the study protocol and informed consent forms. Prior to data collection, written informed consent was obtained from participants in the age range of 17–18 years as well as parents of participants in the age range of 15–16 years. Also, the assent was obtained from participants in this age group of 15–16 years. Secondary and senior secondary students from six schools were recruited from two states of India. For all participants, the demographic variables such as age, gender, religion, class of study, and caste affiliation were elicited by self-report. The Governmental class was obtained from school records. Students were group administered the questionnaires in their respective classes.

In both studies, a double-check process was carried out upon data entry. The full information maximum likelihood (FIML) algorithm was used for managing missing data in all analyses (Baraldi and Enders, 2010).

Statistical Analysis:Statistical analyses were performed using Mplus, version 8 (Muthén and Muthén, 2017). For each of the two samples, confirmatory factor analyses (CFA) as well as exploratory structural equation models (ESEM) were set up to test the suitability of the two FFM measures, BFI-10 and NEO-FFI-3. As estimator we used maximum likelihood with robust standard errors and for ESEM the rotation method was the oblique goemin (Costello and Osborne, 2005). We also calculated internal consistency for each of the five factors using Cronbach's alpha. Using ESEM, we further explored whether factor solutions lower or higher than five might better explain our data. Because of their purely exploratory nature, these additional analyses are only briefly reported in text.

3.2 The Review Study

The review study entailed an exploration of India's complex scenario of social stratification and its impact on the education of Indian students with a special focus on role of the system of reservation on the basis of the governmental class which is actually a caste affiliation based social stratification in India. This was done by examining available empirical studies, position papers, newspaper articles and the education policy of the Government of India and United Nations.

The method was to examine the impact on both the quantity (e.g., the role of infrastructure and the availability of educational facilities) and quality (e.g., skilled teachers and effective curriculum) of education in terms of human resource development. Accordingly, the determinants of education in the developing countries in terms of both quantity and quality were identified. The contextual factors like socio-economic status and psychological factors like the role of self-esteem in contributing to academic performance were examined. Subsequently, the actual impact of the system of reservation on education in India was analyzed. Finally, an alternative to the caste-based reservation was proposed in view of overcoming the impediments of the current system of education in India.

3.3. Governmental class and academic performance

We used a cross-sectional study design to achieve the aim of examining the association between governmental class and academic performance in adolescent school students. Based on the review of literature, we assumed that the three levels in the hierarchy of the governmental class would positively predict academic performance and that family income, self-esteem and life satisfaction would be covariates.

Participants: The study was conducted on a sample of 858 students from the states of Kerala in South India, and Madhya Pradesh, in North India. The participants were in the age range of 15-18 years (Mean age=16.45 and SD 0.78). There were 405 male and 453 female participants. The detailed description of the study sample is given in Table 2.

The participants were recruited from the X or XI grade students from six schools. From each randomly selected division of grade X or XI in each school, all the students in the division were included, which would minimize selection bias. These schools were selected with the aim of incorporating urban and semi-urban population where all the three governmental classes are relatively more likely to be represented in a school. For the same reason, either rural or metropolitan schools were not included. There was a higher representation of the General Class and lower representation of the Scheduled Castes/Tribes when compared with their actual proportion in India (Ministry of Social Justice and Empowerment, Government of India, 2018).

Measures: The students' governmental class was obtained from the school registers, which record this to allow class-based reservation quotas. Students' level of academic performance was obtained from the exam-results from the school authorities. The participating schools from Madhya Pradesh followed CBSE syllabus (Central Board of Secondary Education) and Kerala schools followed SBE syllabus (State Board of Education). The XI grade students were recruited from two different streams: science and commerce. To get comparable results, grades as well as percentages of achieved points were transformed into z-scores. Individual mean z-score across all exams for each student was calculated as indicator of academic performance. Parents' monthly income was used as a proxy for socioeconomic status on a five-point

scale. Self-esteem was assessed with the 10-item Rosenberg Self-Esteem Scale (Rosenberg, 1965; Robins et al., 2001). Satisfaction with Life Scale (SWLS) (Diener et al., 1985) was used as a measure of participants' global cognitive judgment of life satisfaction.

Procedure: The research project was submitted to the Cantonal Ethics Committee (Basel-Stadt and Basel-Land), which positively acknowledged the study protocol and informed consent forms. Prior to data collection, written informed consent was obtained from participants in the age range of 17-18 years as well as parents of participants in the age range of 15-16 years. Also, the assent was obtained from participants in the age range of 15-16 years. The assessments were group-administered during school hours and in classrooms.

Statistical Analyses: We did multiple linear regression and linear multilevel models using Mplus software (Muthén and Muthén, 2017). Multiple regression models were used to assess school specific relationships between the factor governmental class and the target variable academic performance thereby controlling for student's sex, age, and family income, self-esteem and life satisfaction. Separate regression models were run for each of the six schools. A multilevel model was then set up to assess the relationship between governmental class and academic performance for all six schools combined, again controlling for the above-mentioned covariates. This model contained a random intercept.

4. Summary of the Result

4.1. BFI-10 Study and NEO-FFI-3 Study

BFI-10 Study: For the BFI-10 study, the assumed five-factor solution did not converge for either CFA or ESEM. Similarly, for ESEM estimates of several residual variances (item 2, item 3) were negative and standard errors of parameter estimates could not be computed. Therefore, no fit indices are presented. We further explored whether lower or higher factor solution of ESEM lead to a better model fit. A three-factor solution returned a more or less reasonable model fit. Fit indices for this model were: $\chi^2(18) = 144.2$, $p = <0.001$, RMSEA = 0.10 $p(\text{RMSEA}) < 0.001$, CFI = 0.918, TLI = 0.796, SRMR = 0.035 (see Table 3).¹

The reliability analysis for the five subscales of BFI-10 in the overall sample yielded mixed results (see Table 3), with unacceptably low alpha reliabilities for Neuroticism, Extraversion, and Conscientiousness and acceptable alpha reliabilities for Openness and Agreeableness. Openness and Agreeableness showed a strong positive correlation (Spearman's rho = 0.58, $p = 0.001$). These overall results appeared not to be influenced by age as a similar picture was observed in separate analyses with younger (15–16) and older (17–18) subgroups of students. The detailed description of the reliability analysis of BFI-10 is shown in Table 3. Internal consistencies are also presented by age groups (15–16 versus 17–18 years) and by linguistic subgroups (Malayalam speaking, from Kerala, KL versus Hindi speaking, from Madhya Pradesh, MP), again showing poor values Table 4.

¹TLI = Tuck Lewis index, CFI = comparative fit index, RMSEA = root mean square error of approximation, SRMR = standardized root means square residual.

NEO-FFI-3 Study: For the NEO-FFI-3 study, as for the BFI-10 study, the assumed five-factor solution of the CFA did not converge. Fixing factor variances to one while freeing first indicator loadings of each factor lead to model convergence, but the model fit was poor [$\chi^2(1700) = 3261.8$, $p = <0.001$, RMSEA = 0.046 $p(\text{RMSEA}) = 0.998$, CFI = 0.454, TLI = 0.431, SRMR = 0.071] (see Table 4). Though the five-factor solution of the ESEM converged, the model fit was also poor [$\chi^2(1480) = 2289.5$, $p = <0.001$, RMSEA = 0.035 $p(\text{RMSEA}) = 1.00$, CFI = 0.717, TLI = 0.661, SRMR = 0.043] (see Table 5). Internal consistencies for the personality domains in the total sample as well as linguistic subgroups were mostly unacceptable or poor, with the exception of Conscientiousness (Table 4). For age subgroups, (15–16 versus 17–18 years) internal consistency was better for older students especially on Neuroticism and Agreeableness (Table 4).

4.2. Highlights from the Review Study

It is evident that in India – and especially in urban areas – education has led to economic growth, created job opportunities and increased income and thus helped people to rise above their birth and background. But in spite of all hopeful development, still the social order remains immutable and low caste are locked firmly into place by birth and governed by the rigid structure of social rules or as the New York Times put it: Caste is not past (The New York Times, 2013).

Education has the potential for reducing poverty. For example, a study conducted in India showed that post-elementary education has a significant role in reducing absolute and relative poverty by increasing agricultural development in rural areas that in turn boosts economic growth (Tilak, 2007). But although education requires a certain basic quantity in terms of infrastructure and numbers of teachers, it is quality of education that is essential for the economic development of a country (Barro, 1996; Hanushek & Woessmann, 2007). For example, a study conducted in Madhya Pradesh (India) shows that the effects of schooling strongly depends on teachers skills and behaviors, such as the frequent use of black-board, an interaction-focused teaching style, giving and checking class and home works regularly as well as the revision of the previous lessons (Govinda, Varghese, & Carron, 1993). In another study conducted in Madhya Pradesh, India, it was found that the facilities in the school and the quality of teaching, can have effects on the academic performance only when the students are effectively engaged in learning activities (Govinda, et al., 1993).

With regard to characteristics of the students and his background, socioeconomic as well as psychological factors exert a strong influence on education (Farooq, Chaudhry, Shafiq, & Berhanu, 2011). It was observed that the size of the family negatively influences the female attendance in schools in India, because as family becomes larger, elder daughters have to stay at home and carry out household matters (Jaychandran, 2002). On the other hand, the psychological factor of students' self-esteem may also influence academic performance. For example, Vishalakshi and Yeshodhara (2012) reported that high level of self-esteem brings a high level of confidence, which in turn improves academic performance among standard IX students from government and private schools in Mysore, India. Furthermore, they observed that self-esteem itself is strongly influenced by the socio-economic status of parents as well as a friendly and beneficial atmosphere of the schools. This is supported by a study conducted in Haryana, India among 175 higher secondary students, which showed that there is a positive and significant relationship between self-

esteem and family environment and found no significant relationship between self-esteem and socio-economic status (Singh & Bhatia, 2012).

4.3. Governmental class as predictor of Academic Performance

Descriptives of the demographic variables and the measures used for our sample of adolescents are given in Tables 6 and 7.

Multilevel analysis revealed significant differences in academic performance among the three governmental classes, when considering all schools together ($F_{2,845}=5.73$, $p=0.003$). Predicted school performance values were 45.5 (± 3.6), 49.1 (± 3.3), and 51.4 (± 3.3) for low, medium and high-class levels respectively, and were thus increasing with increasing levels of governmental class.

Assuming a linear functionality between governmental classes and academic performance, we obtained a positive association ($\beta=2.71$, $SE=0.78$, $t=3.46$, $p<0.001$), i.e. the higher the class level, the better was the academic performance (Table 8).

5. General Discussion

5.1. The Five-factor measures not suitable for adolescents in the Indian context

India's unique socio-cultural context characterized by caste-based social stratification is assumed to influence the human development of Indian adolescents as well as their school performance. With the objective of investigating this Indian scenario, two quantitative studies and a review study were carried out in this dissertation with a specific reference to the Indian adolescent school students and the socio-cultural context of their education. The first of the two quantitative studies, aimed at psychometric evaluation of the personality measures, BFI-10 and NEO-FFI-3 on the adolescent students, in two independent investigations. The review study sought to broaden our understanding of caste affiliation and its impact on education. Finally, the impact of the governmental class hierarchy on academic performance was examined in another quantitative investigation.

On the psychometric investigation, there was very limited support for a five-factor solution for the two personality measures for the Indian adolescent samples. Acceptable internal consistency was found only for the subscales, Openness to experience and Agreeableness in the BFI-10 and Conscientiousness in the NEO-FFI-3. This finding is crucial especially since a number of other Indian studies we reviewed have either not reported the psychometric qualities of the five factor measures or analyzed data although the measures had poor internal consistency or model fit. At least two other Indian studies (Singh and Yu, 2010; Joshi and Thingujam, 2009) reported internal consistencies similar to our findings.

Thus, our results, combined with the fact that previous studies have not established the suitability of FFM measures for Indian school students, points to three possibilities regarding the applicability of these measures in the Indian context. First, India's cultural difference from the Western societies may have contributed to the results. Even if the five-factor theory is universally applicable, the FFM measures may not be applicable as such in all non-Western cultures and may need modification to fit the Indian socio-cultural context. Second, the Indian society is culturally so diverse that the measures tested with one segment of the society may not be automatically applicable and relevant as such for another segment which is differ-

ent in socio-cultural and geographical-linguistic aspects. Third, the available evidence of applicability of some of the FFM measures for Indian adults may not indicate applicability for Indian adolescents.

With respect to the first possibility, there is empirical evidence to suggest that the FFM measures which have their roots in the individualistic Western society, are less suited to describe personality in some of the collectivistic societies of Africa and Asia (Allik et al., 2013; Allik and Raelo, 2017; Ashton and Lee, 2007; Gurven et al., 2013; Laher, 2013; Singh and Raad, 2017; Valchev et al. 2013; Vogt and Laher, 2009). For example, Laher (2008) based on his review of NEO-PI-R studies in Africa observed that evidence for the structural equivalence of NEO-PI-R across cultures was lacking with respect to the African context. Similarly, Gurven et al (2013) could not replicate the BFI-44 in an indigenous Bolivian sample. In some FFM studies in non-Western cultures, the factors Extraversion and Agreeableness were not clearly differentiated (e.g., Ortiz et al., 2007; Rolland, 2002). Moreover, personality traits captured through descriptive adjectives may not exactly relate to the same construct across cultures (Vogt and Laher, 2009). For instance, in our study, the Malayalam equivalent for the adjective 'worrier' on the item 1 of NEO-FFI-3 ("I am not a worrier"), had alternative shades of meaning as 'a problematic person'. Similarly, all aspects of personality in collectivistic cultures may not be represented in the five-factors. Zhou et al. (2009), for instance, have given evidence of a seven-factor personality structure in Chinese populations. Other Asian studies have provided evidence for additional domains like 'interpersonal relatedness' which are not adequately captured in the FFM (Ashton and Lee, 2007; Cheung, 2004; Cheung et al. 2008). In India, Singh et al. (2013) gave evidence for a three-factor personality structure linked to the ancient upanishadic 'trigunas' and suggested that the FFM did not adequately describe the Hindi speaking participants' personality (see also Singh, 2016; Singh and Raad, 2017). Hence, there are reasons for not expecting that a particular number of trait dimensions would emerge in a non-Western culture when personality factors of an inventory are developed based on lexical usages of the native language, i.e., in an 'emic' measure (Gurven et al., 2013).

The second possibility has to do with India's complex socio-cultural diversity. Current Indian society is characterized by the coexistence of collectivism and individualism and may need multiple and divergent paradigms to define it (Sinha and Tripathi, 1994; Sinha et al., 2001). Allik and McCrae (2004) have observed that the Black and the White South Africans present with different personality profiles though they reside in the same geophysical location. In our study, we tried to evaluate the potential of the FFM to describe two distinct linguistic groups, namely, Malayalam speaking and Hindi speaking students. On NEO-FFI-3, both the groups had acceptable alpha reliability value for the factor Conscientiousness only, and the lowest alpha reliability values were found on the factor Extraversion. Differences in the alpha reliability values were also observed across the two groups. Openness had comparatively higher alpha reliability values for the Malayalam speaking students in both BFI-10 and NEO-FFI-3 measures. It has been observed that the factor Openness show relatively weak alpha reliability value in collectivistic and less developed countries (Piedmont et al., 2002). Kerala is relatively more 'westernized' as compared to other states in India, and its scale of human development is comparable to that of some of the developed countries (Aneesha and Praseetha, 2016). Hence, the difference of alpha reliability on this domain might be an indicator of the cultural difference of the two linguistic groups.

Thirdly, this study raises questions about the applicability of these five-factor measures in their current form for the Indian adolescents. Although some of the studies using NEO Inventories have demonstrated

evidence for the FFM in Indian adult sample, validating the measures on adults may not automatically make them reliable and valid for adolescents. Though the Western validation studies provide an age range beginning at 12 years, our findings point to the possibility that the secondary and senior secondary students may present with either a different personality profile or a poorly consolidated personality, or simply that the questionnaires are not able to capture personality in this population. The development of identity and personality in adolescence follows the maturity principle, wherein freedom and perceived autonomy facilitates seeking out social contexts conducive for building up dispositional attributes like the five-factors (Caspi et al., 2005). In this regard, the collectivistic Indian families which foster interdependence and social cohesion rather than self-reliance and self-direction in children may facilitate a different graph of personality formation for the Indian adolescents when compared to their Western counterparts (Arusubila and Subasree, 2016; Chadda and Deb, 2013; Savita et al., 2014). Hence, in India, consolidation of personality in terms of developmental years may not be identical to that of the individualistic Western societies. This argument is strengthened by our finding that, when the NEO-FFI-3 data from the small subsample of students in the age range of 17-18 years was separately analyzed, the internal consistency considerably improved (especially for Neuroticism, Agreeableness). This strengthens the possibility that the measure in its current form is less suitable for the younger Indian adolescents.

5.2. Caste affiliation impacts academic performance

In a second quantitative investigation, we examined adolescent school performance in the context of India's complex fabric of caste-based socioeconomic stratification, with specific reference to the three governmental classes namely, the scheduled castes/tribes (SC-ST), other backward classes (OBC) and general class (GC). Results based on multilevel regression analysis revealed a positive association wherein lower class was likely to be associated with low academic performance, when controlled for family income, self-esteem, and life satisfaction.

In a study that examined how social and economic disadvantage influenced school performance, Conside and Zappalà (2002) observed that the 'social' and the 'economic' components of the socioeconomic status may have distinct and separate influences on academic performance. Class-caste affiliation is an important aspect of the socioeconomic status of Indian students. It is a complex mix of the 'social' and the 'economic', where the caste is more to do with social status and the class is to do with economic status. It is interesting to observe that the students' governmental class predicted their academic performance, while controlling for their family income. Family income did not seem to correspond to social hierarchy in our data Table: 7. Also, an increase of family income may not necessarily correspond to better educational outcomes for the students of low social class. In other words, the educational disadvantage that we observe in our results in the lower governmental class, may not be equated with economic disadvantage.

We examined students from the three governmental classes who study in the same school environment and found that the lower-class lag behind the higher class even when they study together the same subjects in the same classroom. Thomson (2018) observed that students from lower socioeconomic status are likely to have a positive influence when they study along with students of higher socioeconomic status and are likely to perform better academically. This would imply that the gap in academic performance between students from higher and lower governmental classes are likely to widen if students from the schools of the governmental sector and from the rural background are investigated.

5.3. The need for a system of education insensitive to caste affiliation

Our review study on the impact of social stratification on education revealed that while caste affiliation influences self-esteem and educational outcomes, the positive discrimination through caste-based reservation does not appear to make a substantial impact for members of lower class or caste. Dalits and Tribes do not benefit from this positive discrimination (Desai & Kulkarni, 2008). Only a small percentage of SC/ST and OBC members are enjoying the provisions of the reservation system, while the majority of the low caste members still suffers the consequences of their low social status (The New Indian Express, 2014).

To counteract the possible detrimental effects of the social stratification in India, we propose both structural as well as psychological measures. We propose a restructured reservation system in higher education which would be based on the backwardness, i.e. family income, geographical accessibility for schooling, and the academic quality of the student, i.e. her or his school marks and academic performance. Importantly, there are examples that this is possible and effective. For example, the Indian State of Maharashtra reportedly provides scholarship to low-caste/low class students for higher studies based on family income and school marks of the student, empowering members of lower castes/class and in turn increasing the quality of education (The Indian Express, 2016).

Secondly, since the Indian education is very sensitive to social stratification, we propose a social-stratification insensitive education system for India. The basic assumption in this regard is that social-stratification insensitive education thrives on social connections and when the sense of belonging is encouraged in schools. This is exemplified by studies among young and adolescent students in Australia and India, showing that social support, belongingness, friendship and optimism are important determinants of well-being and happiness in adolescent students (O'Rourke & Cooper, 2010; Sharma & Malhotra, 2010). Also, positive social interactions, such as a birthday party with peers, enhances the achievement motivation (Walton, Cohen, Cwir, & Spencer, 2012). Thus, measures to foster social connectedness or belongingness are possible cornerstones of a caste/class-insensitive education.

Walton and Cohen (2011) conducted an intervention aiming to enhance belongingness in otherwise socially stigmatized students, who were unsure of their social belonging in mainstream institutions. The participants who were African-American and European-American college students, underwent an intervention to increase the sense of belonging. The students were provided with the perspective that the experienced social hardship in the academic setting is of short duration as well as shared amongst all students. Thus, the aim of the employed intervention was to encourage students not to attribute experienced personal and social problems to stable deficits of themselves or their ethnic group but to share as well as passing consequences of starting their university studies. The participants were asked to read a report of seemingly true results of a survey amongst senior students. Most of the students in the survey stated that they had worried about whether they belonged in college during the difficult first year, but gradually grew confident as the time passed. The concerns they had about belonging were thus characterized as common at first and as momentary because of the challenging nature of the college. The participants were asked to write an essay describing how their own experience in college might resound the experiences summarized in the survey report. Their essays were further read and captured on video as participants were informed that it would be publicized to future students so that it may help them to ease their transition to college.

This short and well-accepted intervention helped students to reframe their social self-perception and raised academic performance of the African- American students steadily and persistently over the three years' assessment period, cutting the race gap in academic performance by 79% in the final year (Walton & Cohen, 2011). Although these results were obtained in the US-American university setting and thus the employed interventions still need to be tested in different settings and circumstances, we assume that similar strategies could be of use to facilitate a caste-insensitive education system in India.

5.4. Limitations

With respect to our psychometric evaluation of FFM measures, certain methodological limitations need to be highlighted. It was observed in our study that the negatively worded items with reverse scoring caused the 'double negative' effect, had poor factor loadings, and contributed to lower alpha reliability values. Gurven et al. (2013) found that items with a reverse scoring were problematic for his indigenous Bolivian farmers and that removal of these items reduced response biases and improved the factor structure. Hence, modification of these items is likely to strengthen reliability of the measure and produce a better factor structure reflecting the FFM. Similarly, the use of self-rating, without rating by others, poses a problem in adolescent studies. Baker et al. (2004) found that when it comes to investigating adolescent personality, self-rating was a weaker method, as compared to teacher rating and peer rating. Objective report of teacher/parent/peer would strengthen the validity of the FFM measures when used for adolescents.

Secondly, our conclusions about Indian adolescent school students are based on data from only two Indian states and three schools from each, where all the students from the randomly selected divisions of the X or XI grade participated as sample clusters. In discussing governmental class as predicting academic performance, it must be noted that these schools were heterogenous with respect to the proportion of students from the three governmental classes. Nonetheless, our sample points to the ground reality of the presence of students from these three social classes at the level of high school and higher secondary school in the urban/semi-urban private sector schools in India.

Thirdly, our review study may not claim a comprehensive presentation of the Indian scenario. We relied not only on published studies which were few in numbers, but gathered information from other sources like the newspapers and governmental documents. Although we gathered all possible information through an internet-based search, it may not have comprehensively incorporated all the published documents in this domain. Besides, our conclusions regarding the utility of fostering social connection and sense of belonging are based on Western research and interventions. Their applicability for the Indian students needs to be established in the Indian context.

5.5. Conclusion and Implication for Future Research

This dissertation was carried out in India's rich and complex socio-cultural context which was assumed to influence the education of Indian adolescents as well as their personality. Caste affiliation is a central aspect of India's socio-cultural reality. We planned to examine the impact of caste affiliation on Indian adolescent students' school performance as well as their personality consolidation. For this purpose, psychometric evaluation of two big-five measures was attempted on students in the age range of 15-18 years. Though the measures are acclaimed as universally applicable, they were not found reliable and applicable for the Indian adolescents. We conducted a review study on the influence of caste affiliation as well as

caste-based reservation on adolescent education and observed that caste-based stratification and reservation impede rather than enhance education. Further, our quantitative investigation also revealed that the caste-based hierarchy of the governmental class is positively related to academic performance, wherein lower class predicts poor performance.

Our study of the five factor personality measures calls for notice as the first evaluation of the psychometric properties of the big-five traits specifically on Indian adolescent school students. Compared to previous FFM Indian studies of psychometric evaluation, we used a larger sample, translated the measures to native languages and incorporated socio-cultural diversity of participants that enhance generalizability. We found that the FFM measures (BFI-10 and NEO-FFI-3) were not suitable in their current form for the Indian adolescent school students. A valid alternative factor structure did not emerge from our CFA and ESEM or additional analyses. The problem of using reverse items for school students, the confusion that may arise from items with 'double negative' effect, and cultural factors that affect translation may have contributed to poor model fit as well as reliability of the FFM measures in our samples. Besides, the application of Western age norms on Indian students could be problematic since the process of personality consolidation during adolescence may not be identical across cultures. We expect that revision of certain items, such as those involving reverse scoring can lead to clearer patterns when assessing the structure of the FFM in this target population. The results provide important evidence against the practice of using adult personality measures on adolescents without separate psychometric validation. Future studies should address the scope of modifying FFM measures in order to make them valid and sensitive specifically for Indian school students.

We further investigated the academic performance of Indian adolescents who studied in the same school environment but belonged to the three ranks of governmental class, SC-ST, OBC and GC. Multilevel regression indicated that higher level of governmental class predicted better academic performance. We used a sizable overall sample for the study and incorporated diversity. Since we controlled school environment by selecting all students in a class-room, it is likely that other factors of the family and social environment may have contributed to the outcome, especially those linked to social status, such as parental education, neighborhood influence, and caste-related perceptions and experiences. Hence, future studies need to explore the factors and processes by which social status impacts academic performance.

The cultural richness of India and its complex social stratification poses a very sensitive context for education and thus requires particular consideration. Our review study explored Indian education system with regard to possible effects of governmental class and caste stratification. Our analysis on the basis of a differentiated discussion of various resources showed that the success and quality of education is impeded by India's culturally embedded social stratification. The current strategy of the Government of India to tackle the issue is based on a reservation system, which is basically a quota-based affirmative action and thus grounded on backwardness of the caste rather than the quality and family income of the students. However, the outcome entails low benefits for members of low-castes and the risk of reducing the quality of education for all. To counteract the possible detrimental effects of the social stratification in India, we propose both structural as well as psychological measures. With regard to the former, the current reservation systems should be revised as merit as well as income based. With regard to the latter, approaches and actions to foster social connections and the sense of belonging should be considered for fostering

caste/class-insensitive education. Our proposition of a merit-based and social stratification insensitive education thus covers academic, economic and psychological perspectives.

To summarize, the implications of these findings are the following. There is a huge gap of knowledge about Indian adolescents, their personality and its relation to the unique socio-cultural context of the caste-based, collectivistic society. Since there is either a lack of validated measures, or poorly validated ones for examining adolescent personality, researchers need to start from the basics of scale construction and their validation in this population, being sensitive to the socio-cultural context. Similarly, our study calls for further investigation to replicate our findings on the governmental class and its relation to academic performance and other variables like self-esteem and family income. This must be done on larger samples of proportionate representation of each class, different States, linguistic regions, localities including rural population, and other age groups of students. Our documentation of continued influence of caste affiliation under the guise of governmental class should trigger more investigation on the impact of caste system on other domains of life, as well as affirmative action to create a less caste-sensitive society. Our finding that caste affiliation predicts academic performance calls for further exploration of the specific aspects of caste-based social status that impedes educational outcomes. Interventional studies are needed to examine the effect of promoting sense of connection and belong across students from different social status with the aim of neutralizing the influence of caste-affiliation. Finally, our findings call for governmental level policy changes to replace caste-based positive discrimination with a merit and income-based reservation as well as to promote nation-wide programs for building a caste-insensitive society.

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Tables:

Table1: Demographic details of participants

		BFI-10		NEO-FFI-3	
Age (range and M in years)		15-18, M=16.5, SD=0.7		15-18, M=15.9, SD=0.7	
Gender (N/%)		Women	Men	Women	Men
		379/55.8	300/44.2	202/46.1	236/53.9
Standard-levels		N	%	N	%
BFI-10 (X/XI/XII)		356/257/66	52.4/37.8/9.7	143/295	32.6/67.4
NEO-FFI-3 (XI/XII)					
Linguistic sub-groups (N/%)	South India (Kerala)	404/59.5		187/42.7	
	North India (Madhya Pradesh)	275/40.5		251/57.3	
Governmental Class (N/%)	SC/ST	29/4.3		34/7.8	
	OBC	322/47.4		187/42.7	
	General	328/48.3		217/49.5	

SC/ST=Scheduled Cast/Scheduled Tribes, OBC= Other Backward Cast

Table 2: Participants' Demographic information: Frequencies/Percentages

Full Sample N/%			Individual Schools N/%					
			KL1:	KL2:	KL3:	MP1:	MP2:	MP3:
Gender	Male	405/47.2	105/12.2	236/27.5	247/28.8	123/14.3	25/2.9	122/14.2
	Female	453/52.8	57/54.3	123/52.1	139/56.3	0/0	23/92	63/51.6
Govt. Class	SC-ST	68/7.9	1/1.0	39/16.5	12/4.9	4/3.2	0/0	12/9.8
	OBC	370/43.1	84/80.0	93/39.4	168/68.0	12/9.8	6/24	7/5.8
	GC	420/49.0	20/19.0	104/44.1	67/27.1	107/87.0	19/76	103/84.4

Table3: Standardized parameter estimates for the ESEM 3 factor solution of the BFI-3

Item	Scale	1	2	3
1	E	0.075	0.109	0.102
6	E	0.191	0.726	0.020
2	A	0.904	0.426	0.013
7	A	1.047	0.007	-0.179
3	C	0.247	-0.101	-0.517
8	C	0.264	0.461	-0.228
4	N	0.004	-0.494	0.581
9	N	0.030	-0.018	0.753
5	O	0.003	1.093	0.013
10	O	-0.004	0.976	-0.031

Table 4: Internal Consistency of overall sample and linguistic subgroups

		Cronbach's	Age15-16/17-18	KL	MP
		alpha	years	(n=404+187)	(n=275+251)
BFI 10	Neuroticism	0.45	0.36/ 0.53	0.57	0.43
	Extraversion	0.44	0.37/ 0.48	0.43	0.30
	Openness	0.76	0.75/ 0.73	0.55	0.40
	Agreeableness	0.78	0.78/ 0.77	0.57	0.63

	Conscientiousness	0.43	0.34/ 0.53	0.53	0.38
NEO-FFI-3	Neuroticism	0.52	0.53/ 0.62	0.42	0.59
	Extraversion	0.14	0.15/ 0.17	0.16	0.18
	Openness	0.40	0.35/ 0.57	0.52	0.25
	Agreeableness	0.50	0.46/ 0.64	0.55	0.47
	Conscientiousness	0.71	0.73/ 0.72	0.74	0.70

KL Kerala, MP Madhya Pradesh

Table5: Standardized parameter estimates for the CFA and ESEM solution of the NEO-FFI-3

Item	Scale	CFA					ESEM				
		1	2	3	4	5	1	2	3	4	5
1	N	0.037					0.055	-0.464	-0.008	-0.315	0.069
6	N	0.359					0.356	0.219	-0.104	0.188	0.182
11	N	0.471					0.504	0.110	0.085	0.086	0.076
16	N	0.194					0.172	-0.351	-0.119	0.011	0.171
21	N	0.636					0.645	0.005	0.147	0.404	0.060
26	N	0.482					0.520	0.066	0.004	0.115	-
31	N	0.159					0.115	-0.260	-0.097	-0.040	-
36	N	0.584					0.560	0.049	-0.223	0.014	-
41	N	0.593					0.487	-0.075	-0.237	0.184	-
46	N	-0.347					-0.358	-0.084	-0.131	0.072	0.049
51	N	0.525					0.569	0.011	0.209	0.022	-
56	N	0.621					0.614	-0.012	-0.016	0.017	-
2	E		0.359				0.108	0.292	0.080	-0.119	0.012
7	E		0.251				0.000	0.382	-0.090	-0.067	-
12	E		0.180				-0.118	0.111	-0.038	-0.153	-
17	E		-0.540				-0.076	-0.495	-0.079	-0.080	-
22	E		0.120				-0.020	0.081	-0.125	0.355	0.273
27	E		0.444				-0.445	0.302	0.041	0.080	0.127
32	E		0.304				0.010	0.238	-0.078	-0.249	0.247
37	E		0.277				-0.049	0.332	0.019	-0.447	-
42	E		0.446				-0.195	0.463	-0.010	0.150	-
47	E		0.074				0.024	0.164	-0.126	0.025	0.146
52	E		0.087				0.021	-0.119	0.256	-0.193	0.165
57	E		-0.151				-0.164	-0.121	-0.125	-0.157	-
3	O			0.184			0.293	-0.042	0.216	-0.442	0.136
8	O			0.204			0.138	0.154	0.129	0.011	0.138
13	O			0.393			0.069	0.213	0.164	0.033	0.222
18	O			-0.183			-0.107	0.017	-0.033	0.001	-
											0.223

23	O	0.514		-0.094	-0.098	0.431	0.008	0.028
28	O	0.322		-0.415	-0.043	0.087	0.013	0.387
33	O	0.222		-0.270	-0.142	0.028	0.114	0.222
38	O	0.027		0.163	0.202	-0.110	-0.209	0.167
43	O	0.642		-0.025	-0.023	0.488	-0.007	0.073
48	O	0.333		-0.062	0.146	0.214	-0.023	0.019
53	O	0.323		0.019	-0.062	0.209	-0.012	0.312
58	O	0.195		0.064	-0.096	0.197	0.006	0.055
4	A		0.372	0.057	0.108	0.375	0.008	-
								0.041
9	A		0.524	-0.160	-0.024	0.365	0.478	-
								0.090
14	A	0.262		-0.508	0.275	0.078	0.091	-
								0.207
19	A		0.720	-0.022	-0.404	0.735	0.070	-
								0.167
24	A	-0.021		0.014	-0.102	0.007	0.218	-
								0.341
29	A		0.549	0.171	-0.069	0.547	0.165	-
								0.148
34	A		0.337	-0.048	0.191	0.332	-0.025	-
								0.094
39	A	0.133		-0.384	0.227	-0.023	0.105	-
								0.312
44	A	0.323		-0.045	0.023	0.262	0.234	0.044
49	A	0.026		0.212	0.283	-0.016	0.362	0.219
54	A	0.138		0.030	-0.014	0.134	0.369	-
								0.124
59	A		0.505	-0.195	-0.228	0.381	0.093	-
								0.045
5	C		0.392	0.032	0.081	0.424	-0.090	-
								0.047
10	C		0.494	-0.153	0.145	0.422	-0.010	-
								0.033
15	C		0.301	-0.299	-0.024	0.213	-0.637	-
								0.037
20	C		0.604	0.011	0.158	0.532	-0.053	0.068
25	C		0.580	-0.081	0.114	0.431	-0.015	0.213
30	C		0.516	-0.295	-0.111	0.378	0.180	0.259
35	C		0.507	0.064	0.102	0.463	-0.213	0.053
40	C		0.435	-0.048	0.288	0.298	-0.076	0.110
45	C		0.255	-0.289	0.143	0.010	0.282	0.278
50	C		0.534	-0.012	-0.024	0.442	-0.068	0.323
55	C		0.486	-0.441	0.077	0.221	0.047	0.252
60	C		0.355	-0.042	0.056	0.238	0.063	0.283

Table 6: Descriptives: Academic performance, self-esteem and life satisfaction Mean (SD)

	AP	SES	SWLS
Total: N=858	48.5 (16.2)	18.1 (4.2)	21.5 (6.0)
Male: n=405	42.3 (15.7)	18.2 (4.0)	21.4 (5.8)
Female: n=453	53.9 (14.5)	17.9 (4.2)	21.6 (6.2)

SC-ST: n=68	44.5 (16.1)	17.1 (3.3)	21.5 (6.5)
OBC: n=370	43.0 (14.7)	19.1 (4.4)	21.0 (5.9)
GC: n=420	53.8 (15.7)	17.3 (3.9)	22.1 (6.0)

AP: Academic performance, SES: Self-Esteem Scale & SWLS: Satisfaction with Life Scale

Table 7: Frequencies (Percentages) of Income and Govt.class

Income	GC	OBC	SC-ST	Total
Below 5000	79 (19)	89 (24)	23 (34)	191
5000-20000	137 (33)	179 (48)	21 (31)	337
2000-50000	135 (32)	68 (18)	16 (24)	219
50000-1 lakh	65 (16)	22 (6)	06 (9)	93
above 1 lakh	04 (1)	12 (3)	02 (3)	18
Total	420	370	68	858

Table 8: Regression coefficients of a multilevel model with governmental class as continuous predictor (assuming a linear relationship) and academic performance as outcome, controlling for family income, gender, age, self-esteem, and life satisfaction.

Intercept	value	Std.error	DF	t-value	p-value
Govt.class	2.71	0.78	846	3.46	0.006
SES*	0.36	0.12	846	2.93	0.003
SWLS*	0.09	0.08	846	1.16	0.244
Sex	8.29	1.00	846	0.28	0.000
Income	0.35	0.52	846	0.67	0.49
Age	0.02	0.61	846	0.04	0.96

Appendix A

Study I:

Kunel John R, Xavier B, Waldmeier A, Meyer A and Gaab J (2019) Psychometric Evaluation of the BFI-10 and the NEO-FFI-3 in Indian Adolescents. *Front. Psychol.* 10: 1057. doi: 10.3389/fpsyg.2019.01057 (<https://www.frontiersin.org/articles/10.3389/fpsyg.2019.01057/full>)



Psychometric Evaluation of the BFI-10 and the NEO-FFI-3 in Indian Adolescents

Roshin Kunnel John^{1*}, Bobby Xavier¹, Anja Waldmeier¹, Andrea Meyer² and Jens Gaab¹

¹ Division of Clinical Psychology and Psychotherapy, Faculty of Psychology, University of Basel, Basel, Switzerland, ² Division of Clinical Psychology and Epidemiology, Faculty of Psychology, University of Basel, Basel, Switzerland

The Five-Factor Model (FFM) is one of the most commonly examined constructs of personality across cultures in recent times. However, there is a lacuna of evidence for the suitability of FFM measures for Indian adolescent school students below the age of 17 years. We carried out two independent studies for the psychometric evaluation of the measures BFI-10 and NEO-FFI-3 on Indian adolescent school students. Both studies examined two socio-culturally distinct linguistic groups of secondary and senior secondary school students with a total sample of $N = 1117$ students. There was very limited support for a five-factor solution in both cases. Model fit was poor when applying FFM measures to our samples, whether applying confirmatory factor analysis or exploratory structural equation models. The results provide evidence against using adult personality measures with adolescents without separate psychometric validation and applying the Western age norms to Indian students without considering that the process of personality consolidation during adolescence may not be identical across cultures.

Keywords: five-factor model, BFI-10, NEO-FFI-3, psychometric evaluation, Indian adolescents

INTRODUCTION

The scientific examination of personality is driven by the aim of identifying and predicting patterns of individuals' thinking, feeling, and behaving based on the assumption that these patterns are relatively stable and universal amid socio-cultural diversities. Extensive cross-cultural research in the last three decades has come to establish the Five-Factor Model (FFM) of personality, often referred to as the Big Five with its domains *Neuroticism*, *Extraversion*, *Openness to experience*, *Agreeableness*, and *Conscientiousness* (McCrae and John, 1992; Goldberg, 1993; McCrae and Costa, 1997; John et al., 2008). Research on the FFM has led to the development and modifications of two broad sets of measures, i.e., the *Big Five Inventories* (BFI-44, BFI-10, and BFI-2) and the *NEO Inventories* (NEO-PI, NEO-PI-R, NEO-FFI, NEO-PI-3, and NEO-FFI-3). The two most commonly used NEO inventories are the Revised NEO Personality Inventory (NEO-PI-R) and the NEO-Five-Factor Inventory (NEO-FFI) developed by Costa and McCrae (1992). The NEO-FFI-3 (McCrae and Costa, 2007), which is a revision of the NEO-FFI aimed at better readability especially for respondents who are not native English speakers. Across studies, good Cronbach's alpha reliability has been demonstrated for its subscales (McCrae and Costa, 2007; Marjanovic et al., 2015). Furthermore, and independent of the NEO Inventories, the Big Five Inventory-44 (BFI-44) was developed as a time-efficient measure of the FFM (John et al., 1991; Soto and John, 2009). The BFI-44 has been translated into 28 languages and its structure has been replicated in 56 nations (Schmitt et al., 2007). The pursuit of brevity resulted in the BFI-10 (Rammstedt and John, 2007), which consists of just two items to represent each of

OPEN ACCESS

Edited by:

Sergio Machado,
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United Kingdom
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*Correspondence:

Roshin Kunnel John
roshin.kunneljohn@unibas.ch

Specialty section:

This article was submitted to
Quantitative Psychology
and Measurement,
a section of the journal
Frontiers in Psychology

Received: 08 November 2018

Accepted: 24 April 2019

Published: 09 May 2019

Citation:

Kunnel John R, Xavier B,
Waldmeier A, Meyer A and Gaab J
(2019) Psychometric Evaluation of the
BFI-10 and the NEO-FFI-3 in Indian
Adolescents.
Front. Psychol. 10:1057.
doi: 10.3389/fpsyg.2019.01057

the five core personality dimensions. Brief as it is, the BFI-10 offers an efficient assessment and has been validated in the United States and Germany in the respective languages (Rammstedt and John, 2007; Rammstedt et al., 2013). The Next Big Five Inventory (BFI-2) is a new 60 item measure of the five-factors (Soto and John, 2017).

The diverse FFM measures have gathered a strong evidence base in the Western societies where they originated (Goldberg, 1993; Costa and McCrae, 1997; McCrae and Costa, 2010) and their psychometric qualities were reproduced in a number of cross-cultural studies incorporating different societies on most continents (McCrae and Terracciano, 2005; Schmitt et al., 2007; see also Allik and Realo, 2017). However, a few studies could not replicate the five-factor structure in non-Western societies (e.g., Cheung et al., 2011; Gurven et al., 2013; Zecca et al., 2013). Gurven et al. (2013) argued that, even in cross-cultural studies the participation was often limited to the educated urban population and that the FFM is yet to have evidence for indigenous and often illiterate societies (Gurven et al., 2013). Besides, these cross-cultural studies have observed small variances from the United States normative data in the developing countries (McCrae and Terracciano, 2005; Schmitt et al., 2007).

Five-factor model studies in Europe and the United States have demonstrated the five-factor structure in adolescents with the lowest age cut-off of 12 years in the normative data for the Big Five as well as the NEO inventories (Costa et al., 2000; McCrae et al., 2002; McCrae and Costa, 2004; O'Connor and Paunonen, 2007; Klimstra et al., 2009). However, it has been observed that adolescents below 16 years of age are likely to provide a relatively lower quality of the self-reported personality trait structure (Allik and Realo, 2017).

With respect to the FFM research in India, so far, around 35 published studies have employed either the NEO inventories or the Big Five inventories in the Indian context. However, most of these studies were conducted on adults and college students, and none of these studies have reported the psychometric values of the FFM measures on adolescent school students. The NEO Inventories were used in 21 out of the 35 FFM studies. Of these, three studies addressed psychometric evaluation of the NEO inventories. Lodhi et al. (2002) and Singh (2009) examined NEO-PI-R, and Piedmont and Braganza (2015) studied NEO-PI-3. Whereas Singh (2009) studied young adults in the age range of 18–25 years, the other two studies were conducted on adult samples in the age range of 18–60 years. All the three studies found acceptable alpha reliability values ranging from 0.73 to 0.93 for the five-factors, and the factor structures were replicated. However, it was found that the scores for factors Extraversion and Agreeableness aligned differently from the pattern in the United States normative data. Four FFM studies in which the NEO-FFI was used with adults, reported acceptable alpha reliability values ranging from 0.63 to 0.88 (Dubey et al., 2010; Madnawat and Mehta, 2012; Dabke, 2014; Magan et al., 2014). However, in a study on postgraduate students, Joshi and Thingujam (2009) reported inadequate alpha reliability values for the NEO-FFI. The obtained psychometric values of the FFM measures are not mentioned in the other studies including 12 studies which administered the NEO-FFI/NEO-PI-R on college

students or working youth of 18–30 years of age (Chaturvedula and Joseph, 2007; Pavitra et al., 2007; Sharma et al., 2010; Fazeli, 2012; Sushma et al., 2015; Sharma and Gill, 2016; Srivastava and Mishra, 2016; Gupta, 2017; Mandal, 2017; Rita, 2017; Ullah, 2017; Abbas and Khan, 2018). Singh and Ullah (2016) used NEO-PI-R with adolescent school students, but did not mention the obtained alpha reliability values.

Unlike the NEO inventories, there are no published Indian studies on the psychometric evaluation of any version of the BFI. The Big Five Inventories were used in 14 out of the 35 FFM studies. In eight of them, the BFI-44 were administered with working youth or college students (Andi, 2012; Subramanian et al., 2012; Aggarwal et al., 2014; Joshi and Bhardwaj, 2016; Patki and Abhyankar, 2016; Saini et al., 2016; Thurackal et al., 2016; Parekh, 2018), and in two other studies of young adults the BFI-10 was used (Varghese and Raj, 2014; Mahajan et al., 2017). There were also two studies in which the BFI-44 was used with school students (Kumari and Sharma, 2016; Salve et al., 2017). Unfortunately, none of these 12 studies mentioned the obtained psychometric values of the BFI-44 or BFI-10. In the international cross-cultural study of Schmitt et al. (2007) 100 Indian college students were included. However, separate scores for the Indian subgroup are not mentioned in the study. Finally, Singh and Yu (2010) who reported the obtained alpha reliability values of the BFI-44, which was administered on college students aged 18–27 years, found that none of the five-factors had acceptable alpha reliability.

Thus, no study has yet reported the psychometric values of NEO-FFI-3 and BFI-10 in India and no study has yet examined the applicability of the FFM for the Indian adolescents. Unfortunately, the few published studies (e.g., Kumari and Sharma, 2016; Singh and Ullah, 2016) in which FFM measures were administered on Indian adolescent school students, do not report the psychometric values. Though the applicability of FFM measures for Indian adults have been demonstrated in some studies, a few studies raise questions. Besides, establishing the applicability of the measures on adults does not automatically make them reliable and valid for the adolescents. We therefore set out to evaluate the psychometric properties of BFI-10 and NEO-FFI-3 on Indian adolescents in two independent and multisite studies. We aimed at replicating the five-factor structure on school-going Indian adolescents in the age group of 15–18 years, and to examine the utility of time-effective FFM measures for this age-group in the Indian context.

India is unique in its complex ethnic and cultural diversity. The seven-decade old nation retains a diversity of over 10,000 distinct ethnic communities (Fearon, 2003; Roy, 2011), and 1,369 languages (Census of India, 2011). The Indian “societies” have been described as predominantly collectivistic and interdependent (Sinha et al., 2001) and hence socio-culturally distinct from the individualistic Anglo-American societies where the FFM was developed. We set out to examine two socio-culturally distinct and geographically distant linguistic groups of adolescents from two Indian states: Madhya Pradesh from North India and Kerala from South India. Kerala ranks as one of the best among Indian states on social developmental and quality

of life indicators, whereas Madhya Pradesh stands slightly below the average rates for India (Census of India, 2011). Kerala has the highest literacy rate (94%) among Indian states, much higher than Madhya Pradesh (70%) and the national literacy rate (74%). Kerala boasts of equal educational opportunity for male and female children as compared to the other Indian states including Madhya Pradesh where females lag behind. Kerala also has the highest life-expectancy and infant mortality rates, while Madhya Pradesh is close to India's average rates (Census of India, 2011). Keralites speak Malayalam as their mother tongue whereas the mother tongue of Madhya Pradesh is Hindi which is India's most common language. We used native translations of the measures, and sought to incorporate cultural diversity by including self-report of religion and caste affiliation as well as school records of the governmental class stratification of the students.

MATERIALS AND METHODS

We explored the psychometric properties of the BFI-10 and the NEO-FFI-3 personality inventories in two separate studies with two independent groups of adolescent school students. We used single-group cross-sectional designs for both the studies.

Participants

BFI-10 study was conducted on a sample of 679 students and the NEO-FFI-3 study on 438 students. For both studies, participants were in the age range of 15–18 years. Both studies had linguistic subgroups with reference to the two States where the study was done, i.e., Kerala in South India and Madhya Pradesh in North India. Details of the demographic information on the two studies are given in Table 1.

Measures

For the BFI-10 study, we used the 10-item short-version of the Big Five Inventory (BFI-10, Rammstedt and John, 2007). The BFI-10 has five subscales with two bidirectional items for each of the big-five personality factors. The items are rated on a five-point Likert scale wherein the subjects choose from responses

ranging from “strongly disagree to strongly agree.” For the NEO-FFI-3 study, we used the NEO-FFI-3 form S – Adolescent, Self-Report which consists of 60 items, with 12 items each for the big-five personality factors (McCrae and Costa, 2010). The NEO-FFI-3 is a revision of the NEO-FFI (Costa and McCrae, 1992) in which 15 of the 60 items have been revised to improve readability and psychometric properties. The measure uses a five-point Likert scale of responses ranging from “strongly disagree to strongly agree.”

Procedure

For both the BFI-10 and the NEO-FFI-3 measures, translated versions of Hindi and Malayalam were used. Questionnaires were first translated into the regional Indian languages, i.e., Hindi for students in Madhya Pradesh and Malayalam for students in Kerala, by two Indian native school teachers and translated back into English by two different Indian native school teachers. These final English versions were then checked by the principal investigator (JG) in Switzerland through comparison of the back-translations with original English versions of the BFI-10 and NEO-FFI-3.

The research project was submitted to the Cantonal Ethics Committee (Basel-Stadt and Basel-Land), which positively acknowledged the study protocol and informed consent forms but stated that the approval needed to be assessed by local authorities. We therefore also obtained the necessary permission from the respective school management trustees as well as the permission of school principals. Prior to data collection, written informed consent was obtained from participants in the age range of 17–18 years as well as parents of participants in the age range of 15–16 years. Also, the assent was obtained from participants in this age group of 15–16 years.

The BFI-10 study was conducted between April and June 2014 and the NEO-FFI-3 study between February and March 2016. Secondary and senior secondary students from six schools were recruited from two states of India, i.e., Hindi speaking students from Madhya Pradesh in North India and Malayalam speaking students from Kerala in South India. Participants for both the studies were recruited from the same schools.

TABLE 1 | Participants demographic details.

Age (range and M in years)	BFI-10		NEO-FFI-3	
	15–18, M = 16.5, SD = 0.7		15–18, M = 15.9, SD = 0.7	
Gender (N%)	Women	Men	Women	Men
Standard-levels	N	%	N	%
BFI-10 (X/XI/XII)	356/257/66	52.4/37.8/9.7	143/295	32.6/67.4
NEO-FFI-3 (XI/XII)				
Linguistic subgroups (N%)	South India (Kerala)		187/42.7	
	North India (Madhya Pradesh)		251/57.3	
Governmental Class (N%)	SC/ST		34/7.8	
	OBC		187/42.7	
	General		217/49.5	

NB: SC/ST, scheduled cast/scheduled tribes; OBC, other backward class.

Questionnaires and the respective instructions for use were sent to the instructed contact persons in India who supervised the study procedure. School teachers were assigned to collect data from participants allotted to their supervision. For all participants, the demographic variables such as age, gender, religion, class of study, and caste affiliation were elicited by self-report. The Governmental class stratification, which comprises General Class, Scheduled Castes, and Scheduled Tribes, and Other Backward Class was obtained from school records. Students were asked to complete the questionnaires according to the written instructions. Participants of BFI-10 study were given 15 min and participants of NEO-FFI-3 study were given 40 min to complete the questionnaires. The completed questionnaires were collected and sent back to Switzerland for scoring and analysis.

In both studies, a double-check process was carried out upon data entry. Subsequently, data validation was carried out according to the administration and scoring instructions in the manuals. In BFI-10, the data of 6 students were deleted because of incomplete demographic information. For NEO-FFI-3, in the case of ten or more missing items, the data was considered invalid as per the instructions in the manual (McCrae and Costa, 2010). In consequence, the data of 12 students were deleted, of which 10 students had ten or more missing items and two students did not provide demographic information. The full information maximum likelihood (FIML) algorithm was used for managing missing data in all analyses (Baraldi and Enders, 2010). The overall number of participants in the two studies were $N = 1135$ (BFI-10: $N = 685$ and NEO-FFI-3: $N = 450$). After the removal of 18 incomplete data from both the studies (BFI-10: $n = 6$ and NEO-FFI-3: $n = 12$), the overall sample for analysis was 1117.

Statistical Analyses

Statistical analyses were performed using Mplus, version 8 (Muthén and Muthén, 2017). For each of the two samples, confirmatory factor analyses (CFA) as well as exploratory structural equation models (ESEM) were set up to test the suitability of the two FFM measures, BFI-10, and NEO-FFI-3. As estimator we used maximum likelihood with robust standard errors and for ESEM the rotation method was the oblique goemin (Costello and Osborne, 2005). We also calculated internal consistency for each of the five factors using Cronbach's alpha.

Using ESEM, we further explored whether factor solutions lower or higher than five might better explain our data. Because of their purely exploratory nature, these additional analyses are only briefly reported in text.

RESULTS

BFI-10 Study

For the BFI-10 study, the assumed five-factor solution did not converge for either CFA or ESEM. For CFA, fixing factor variances to one while freeing first indicator loadings of each factor did not fix the problem. Fixing the loading of one item (item 4) to a predefined value lead to model convergence but the latent variable covariance matrix was not positive with several negative estimates of residual variances (item 4, item 6,

TABLE 2 | Standardized parameter estimates for the ESEM 3 factor solution of the BFI-3.

Item	Scale	1	2	3
1	E	0.075	0.109	0.102
6	E	0.191	0.726	0.020
2	A	0.904	0.426	0.013
7	A	1.047	0.007	-0.179
3	C	0.247	-0.101	-0.517
8	C	0.264	0.461	-0.228
4	N	0.004	-0.494	0.581
9	N	0.030	-0.018	0.753
5	O	0.003	1.093	0.013
10	O	-0.004	0.976	-0.031

and item 8). Similarly, for ESEM estimates of several residual variances (item 2, item 3) were negative and standard errors of parameter estimates could not be computed. Therefore, no fit indices are presented.

We further explored whether lower or higher factor solution of ESEM lead to a better model fit. Unlike the four-factor solution, which also involved model fit problems (i.e., negative residual variances), a three-factor solution returned a more or less reasonable model fit. Fit indices for this model were (see **Table 2**): $\chi^2(18) = 144.2$, $p = <0.001$, RMSEA = 0.10 $p_{(RMSEA)} < 0.001$, CFI = 0.918, TLI = 0.796, SRMR = 0.035. Higher factor solutions suffered from the same model convergence problems as the five-factor solution.¹

The reliability analysis for the five subscales of BFI-10 in the overall sample yielded mixed results (see **Table 3**), with unacceptably low alpha reliabilities for Neuroticism, Extraversion, and Conscientiousness and acceptable alpha reliabilities for Openness and Agreeableness. Openness and Agreeableness showed a strong positive correlation (Spearman's $\rho = 0.58$, $p = 0.001$). These overall results appeared not to be influenced by age as a similar picture was observed in separate analyses with younger (15–16) and older (17–18) subgroups of students. The detailed description of the reliability analysis of BFI-10 is shown in **Table 3**.

Internal consistencies are also presented by age groups (15–16 versus 17–18 years) and by linguistic subgroups (Malayalam speaking, from Kerala, KL versus Hindi speaking, from Madhya Pradesh, MP), again showing poor values (**Table 3**).

NEO-FFI-3 Study

For the NEO-FFI-3 study, as for the BFI-10 study, the assumed five-factor solution of the CFA did not converge. Fixing factor variances to one while freeing first indicator loadings of each factor lead to model convergence, but the model fit was poor [$\chi^2(1700) = 3261.8$, $p = <0.001$, RMSEA = 0.046 $p_{(RMSEA)} = 0.998$, CFI = 0.454, TLI = 0.431, SRMR = 0.071] (see **Table 4**). Though the five-factor solution of the ESEM converged, the model fit was also poor [$\chi^2(1480) = 2289.5$, $p = <0.001$,

¹TLI, Tuck Lewis index; CFI, comparative fit index; RMSEA, root mean square error of approximation; SRMR, standardized root means square residual.

TABLE 3 | Internal consistency of overall sample and linguistic subgroups.

		Cronbach's alpha	Age 15–16/ 17–18 years	KL (n = 404 + 187)	MP (n = 275 + 251)
BFI 10	Neuroticism	0.45	0.36/0.53	0.57	0.43
	Extraversion	0.44	0.37/0.48	0.43	0.30
	Openness	0.76	0.75/0.73	0.55	0.40
	Agreeableness	0.78	0.78/0.77	0.57	0.63
NEO-FFI-3	Conscientiousness	0.43	0.34/0.53	0.53	0.38
	Neuroticism	0.52	0.53/0.62	0.42	0.59
	Extraversion	0.14	0.15/0.17	0.16	0.18
	Openness	0.40	0.35/0.57	0.52	0.25
	Agreeableness	0.50	0.46/0.64	0.55	0.47
	Conscientiousness	0.71	0.73/0.72	0.74	0.70

NB: KL, Kerala; MP, Madhya Pradesh.

RMSEA = 0.035 $p_{(RMSEA)} = 1.00$, CFI = 0.717, TLI = 0.661, SRMR = 0.043] (see **Table 4**).

Exploring lower factor solutions for ESEM lead to worse model fit, while higher factor solutions (6- and 7-factors) hardly improved model fit compared to the five-factor solution.

Internal consistencies for the personality domains in the total sample as well as linguistic subgroups were mostly unacceptable or poor, with the exception of Conscientiousness (**Table 3**). For age subgroups, (15–16 versus 17–18 years) internal consistency was better for older students especially on Neuroticism and Agreeableness (**Table 3**).

DISCUSSION

We conducted two independent studies exploring the factor structure and reliability of BFI-10 and NEO-FFI-3 with two socio-culturally distinct linguistic groups of Indian adolescent school students. There was very limited support for a five-factor solution for both measures in our samples. Model fit was poor when applying CFA or ESEM for both BFI-10 (Rammstedt and John, 2007) and NEO-FFI-3 (McCrae and Costa, 2007). Acceptable internal consistency was found only for the subscales, Openness to experience and Agreeableness in the BFI-10 and Conscientiousness in the NEO-FFI-3.

On BFI-10, while five-factor solution did not converge on CFA and ESEM, a three-factor solution of ESEM lead to a better model fit. However, only the items for Neuroticism clustered, and a meaningful pattern could not be identified on the other two factors (**Table 2**). This seems to suggest that the ultra-brief BFI-10 measure may not be applicable in its current form for Indian adolescent school students.

On NEO-FFI-3, while a five-factor solution converged on CFA and ESEM with a poor model fit, lower or higher factor solutions did not lead to a better model fit. All the 12 items for Conscientiousness clustered on CFA. For Neuroticism, three of the 12 items had poor factor loading and these were items with reverse scoring (**Table 4**). Other subscales did not emerge clearly. This points to the need for modification of the measure in order to examine the applicability of FFM for this target population.

Whereas previous studies have not examined the factor structure and reliability of the FFM measures in Indian adolescents, in two Indian studies of college students (18–27 years of age) which used FFM measures, the alpha reliability values obtained were similar to the results in our studies. On BFI-44, Singh and Yu (2010) found that none of the five-factors had acceptable internal consistency (Cronbach's alpha coefficients: Conscientiousness $\alpha = 0.52$, Neuroticism $\alpha = 0.54$, Openness $\alpha = 0.54$; Agreeableness $\alpha = 0.64$ and Extraversion $\alpha = 0.67$). These values show some resemblance to the results in our BFI-10 study. Similarly, Joshi and Thingujam (2009) reported unacceptable internal consistency for the NEO-FFI subscales (Neuroticism $\alpha = 0.61$, Openness $\alpha = 0.49$; Agreeableness $\alpha = 0.51$ and Extraversion $\alpha = 0.63$), except Conscientiousness ($\alpha = 0.71$). These values closely resemble the obtained alpha reliabilities in our NEO-FFI-3 study.

Our results, combined with the fact that previous studies have not established the suitability of FFM measures for Indian school students, points to three possibilities regarding the applicability of these measures in the Indian context. First, India's cultural difference from the Western societies may have contributed to the results. Even if the five-factor theory is universally applicable, the FFM measures may not be applicable as such in all non-Western cultures and may need modification to fit the Indian socio-cultural context. Second, the Indian society is culturally so diverse that the measures tested with one segment of the society may not be automatically applicable and relevant as such for another segment which is different in socio-cultural and geographical-linguistic aspects. Third, the available evidence of applicability of some of the FFM measures for Indian adults may not indicate applicability for Indian adolescents.

With respect to the first possibility, there is empirical evidence to suggest that the FFM measures which have their roots in the individualistic Western society, are less suited to describe personality in some of the collectivistic societies of Africa and Asia (Ashton and Lee, 2007; Vogt and Laher, 2009; Allik et al., 2013; Gurven et al., 2013; Laher, 2013; Valchev et al., 2013; Allik and Realo, 2017; Singh and De Raad, 2017). For example, Laher (2008) based on his review of NEO-PI-R studies in Africa observed that evidence for the structural equivalence of NEO-PI-R across cultures was lacking with respect to the African

TABLE 4 | Standardized parameter estimates for the CFA and ESEM solution of the NEO-FFI-3.

Item	Scale	CFA					ESEM				
		1	2	3	4	5	1	2	3	4	5
1	N	0.037					0.055	-0.464	-0.008	-0.315	0.069
6	N	0.359					0.356	0.219	-0.104	0.188	0.182
11	N	0.471					0.504	0.110	0.085	0.086	0.076
16	N	0.194					0.172	-0.351	-0.119	0.011	0.171
21	N	0.636					0.645	0.005	0.147	0.404	0.060
26	N	0.482					0.520	0.066	0.004	0.115	-0.077
31	N	0.159					0.115	-0.260	-0.097	-0.040	-0.062
36	N	0.584					0.560	0.049	-0.223	0.014	-0.009
41	N	0.593					0.487	-0.075	-0.237	0.184	-0.036
46	N	-0.347					-0.358	-0.084	-0.131	0.072	0.049
51	N	0.525					0.569	0.011	0.209	0.022	-0.389
56	N	0.621					0.614	-0.012	-0.016	0.017	-0.144
2	E		0.359				0.108	0.292	0.080	-0.119	0.012
7	E		0.251				0.000	0.382	-0.090	-0.067	-0.110
12	E		0.180				-0.118	0.111	-0.038	-0.153	-0.162
17	E		-0.540				-0.076	-0.495	-0.079	-0.080	-0.007
22	E		0.120				-0.020	0.081	-0.125	0.355	0.273
27	E		0.444				-0.445	0.302	0.041	0.080	0.127
32	E		0.304				0.010	0.238	-0.078	-0.249	0.247
37	E		0.277				-0.049	0.332	0.019	-0.447	-0.046
42	E		0.446				-0.195	0.463	-0.010	0.150	-0.022
47	E		0.074				0.024	0.164	-0.126	0.025	0.146
52	E		0.087				0.021	-0.119	0.256	-0.193	0.165
57	E		-0.151				-0.164	-0.121	-0.125	-0.157	-0.204
3	O			0.184			0.293	-0.042	0.216	-0.442	0.136
8	O			0.204			0.138	0.154	0.129	0.011	0.138
13	O			0.393			0.069	0.213	0.164	0.033	0.222
18	O			-0.183			-0.107	0.017	-0.033	0.001	-0.223
23	O			0.514			-0.094	-0.098	0.431	0.008	0.028
28	O			0.322			-0.415	-0.043	0.087	0.013	0.387
33	O			0.222			-0.270	-0.142	0.028	0.114	0.222
38	O			0.027			0.163	0.202	-0.110	-0.209	0.167
43	O			0.642			-0.025	-0.023	0.488	-0.007	0.073
48	O			0.333			-0.062	0.146	0.214	-0.023	0.019
53	O			0.323			0.019	-0.062	0.209	-0.012	0.312
58	O			0.195			0.064	-0.096	0.197	0.006	0.055
4	A				0.372		0.057	0.108	0.375	0.008	-0.041
9	A				0.524		-0.160	-0.024	0.365	0.478	-0.090
14	A				0.262		-0.508	0.275	0.078	0.091	-0.207
19	A				0.720		-0.022	-0.404	0.735	0.070	-0.167
24	A				-0.021		0.014	-0.102	0.007	0.218	-0.341
29	A				0.549		0.171	-0.069	0.547	0.165	-0.148
34	A				0.337		-0.048	0.191	0.332	-0.025	-0.094
39	A				0.133		-0.384	0.227	-0.023	0.105	-0.312
44	A				0.323		-0.045	0.023	0.262	0.234	0.044
49	A				0.026		0.212	0.283	-0.016	0.362	0.219
54	A				0.138		0.030	-0.014	0.134	0.369	-0.124
59	A				0.505		-0.195	-0.228	0.381	0.093	-0.045
5	C					0.392	0.032	0.081	0.424	-0.090	-0.047
10	C					0.494	-0.153	0.145	0.422	-0.010	-0.033
15	C					0.301	-0.299	-0.024	0.213	-0.637	-0.037

(Continued)

TABLE 4 | Continued

Item	Scale	CFA					ESEM				
		1	2	3	4	5	1	2	3	4	5
20	C					0.604	0.011	0.158	0.532	-0.053	0.068
25	C					0.580	-0.081	0.114	0.431	-0.015	0.213
30	C					0.516	-0.295	-0.111	0.378	0.180	0.259
35	C					0.507	0.064	0.102	0.463	-0.213	0.053
40	C					0.435	-0.048	0.288	0.298	-0.076	0.110
45	C					0.255	-0.289	0.143	0.010	0.282	0.278
50	C					0.534	-0.012	-0.024	0.442	-0.068	0.323
55	C					0.486	-0.441	0.077	0.221	0.047	0.252
60	C					0.355	-0.042	0.056	0.238	0.063	0.283

Items above 0.30 are bold (Brown, 2006).

context. Similarly, Gurven et al. (2013) could not replicate the BFI-44 in an indigenous Bolivian sample. In some FFM studies in non-Western cultures, the factors Extraversion and Agreeableness were not clearly differentiated (e.g., Rolland, 2002; Ortiz et al., 2007). Moreover, personality traits captured through descriptive adjectives may not exactly relate to the same construct across cultures (Vogt and Laher, 2009). For instance, in our study, the Malayalam equivalent for the adjective “worrier” on the item 1 of NEO-FFI-3 (“I am not a worrier”), had alternative shades of meaning as “a problematic person.” Similarly, all aspects of personality in collectivistic cultures may not be represented in the five-factors. Zhou et al. (2009), for instance, have given evidence of a seven-factor personality structure in Chinese populations. Other Asian studies have provided evidence for additional domains like “interpersonal relatedness” which are not adequately captured in the FFM (Cheung, 2004; Ashton and Lee, 2007; Cheung et al., 2008). In India, Singh et al. (2013) gave evidence for a three-factor personality structure linked to the ancient upanishadic “trigunas” and suggested that the FFM did not adequately describe the Hindi speaking participants’ personality (see also Singh, 2016; Singh and De Raad, 2017). Hence, there are reasons for not expecting that a particular number of trait dimensions would emerge in a non-Western culture when personality factors of an inventory are developed based on lexical usages of the native language, i.e., in an “emic” measure (Gurven et al., 2013).

The second possibility has to do with India’s complex socio-cultural diversity. Current Indian society is characterized by the coexistence of collectivism and individualism and may need multiple and divergent paradigms to define it (Sinha and Tripathi, 1994; Sinha et al., 2001). Allik and McCrae (2004) have observed that the Black and the White South Africans present with different personality profiles though they reside in the same geophysical location. In our study, we tried to evaluate the potential of the FFM to describe two distinct linguistic groups, namely, Malayalam speaking and Hindi speaking students. On NEO-FFI-3, both the groups had acceptable alpha reliability value for the factor Conscientiousness only, and the lowest alpha reliability values were found on the factor Extraversion. Differences in the alpha reliability values were also observed across the two groups. Openness had comparatively higher alpha

reliability values for the Malayalam speaking students in both BFI-10 and NEO-FFI-3 measures. It has been observed that the factor Openness show relatively weak alpha reliability value in collectivistic and less developed countries (Piedmont et al., 2002). Kerala is relatively more “westernized” as compared to other states in India, and its scale of human development is comparable to that of some of the developed countries (Anisha and Praseetha, 2016). Hence, the difference of alpha reliability on this domain might be an indicator of the cultural difference of the two linguistic groups. Group differences on personality domains were not examined in this study because the factor subscales did not emerge as reliable.

Thirdly, this study raises questions about the applicability of the five-factor measures for the Indian adolescents. Although some of the studies using NEO Inventories have demonstrated evidence for the FFM in Indian adult sample, validating the measures on adults may not automatically make them reliable and valid for adolescents. Adolescent personality development in the predominantly collectivistic and interdependent Indian societies is likely to follow a trajectory different from that of the individualistic and personal agency based European-American societies where the FFM was developed (Chadda and Deb, 2013; Schwartz et al., 2012). Though the Western validation studies provide an age range beginning at 12 years, our findings point to the possibility that the secondary and senior secondary students may present with either a different personality profile or a poorly consolidated personality, or simply that the questionnaires are not able to capture personality in this population. Collectivistic Indian families foster social cohesion, role conformity and interdependence in children rather than self-direction and personal choice (Chadda and Deb, 2013; Savita et al., 2014; Arusubila and Subasree, 2016). The development of identity and personality in adolescence follows the maturity principle, wherein freedom and perceived autonomy facilitates seeking out social contexts conducive for building up dispositional attributes like the five-factors (Caspi et al., 2005). Hence, in India, personality consolidation in terms of developmental years may not be identical to that of the individualistic Western societies. This argument is strengthened by our finding that, when the NEO-FFI-3 data from the small subsample of students in the age range of 17–18 years was separately analyzed, the internal

consistency considerably improved (especially for Neuroticism, Agreeableness). This strengthens the possibility that the measure is less suitable for the younger Indian adolescents.

A few methodological factors may also have contributed to the results of our study. Imported measures are likely to suffer from lack of item relevance in the local culture which may affect translation (Ashton et al., 1998). Allik et al. (2013) argue that poor fit of FFM in less industrialized population could be attributed to aspects of the data quality such as negative item bias. According to them, people in less developed countries who live in relative poverty are likely to mark negatively worded items differently from the positively worded items. Besides, the problem of “double negative” may occur when responding negatively to an item with a reverse score. For instance, responding to the item “I am not a worrier” (NEO-FFI-3, item 1) might pose a problem. If someone asks “Are you not a worrier?”, answering “No” would mean the person is not a worrier. However, responding negatively to the item “I am not a worrier” would give the opposite sense that the person is actually a worrier. A recent research by Suárez-Alvarez et al. (2018) shows that the use of reverse and regular items in Likert scales is a questionable practice. According to these authors, comprehension of reversed items needs better linguistic skills and hence favors participants with higher verbal abilities. Also, these items are likely to reduce response variability and the quality of psychometric properties (Suárez-Alvarez et al., 2018). Gurven et al. (2013) found that items with a reverse scoring were problematic for his indigenous Bolivian farmers and that removal of these items reduced response biases and improved the factor structure. It was observed in our study that the negatively worded items with reverse scoring such as the one mentioned above had poor factor loadings and contributed to lower alpha reliability values. Hence, modification of these items is likely to strengthen reliability of the measure and produce a better factor structure reflecting the FFM.

The use of self-rating poses yet another problem in adolescent studies. In this study, as in all previous Indian studies of FFM measures, self-rating questionnaire was used without rating by others. Objective report of teacher/parent/peer would strengthen the validity of self-rating by adolescents. Baker et al. (2004) used multi-rating to examine the convergent and discriminant validity of the five-factor personality measure for adolescents. They found that when it comes to investigating adolescent personality, self-rating was a weaker method, as compared to teacher rating and peer rating. Allik and Realo (2017) have proposed that objective rating is needed along with self-rating for participants who are below 16 years of age.

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The present study calls for notice as the first evaluation of the psychometric properties of the big-five traits specifically on Indian adolescent school students. Compared to previous FFM Indian studies of psychometric evaluation, we used a larger sample, translated the measures to native languages and incorporated socio-cultural diversity of participants that enhance generalizability. We found that the FFM measures (BFI-10 and NEO-FFI-3) were not suitable as such for the Indian adolescent school students. A valid alternative factor structure did not emerge from our CFA and ESEM or additional analyses. The problem of using reverse items for school students, the confusion that may arise from items with “double negative,” and cultural factors that affect translation may have contributed to poor model fit and reliability of the FFM measures in our samples. Besides, the application of Western age norms on Indian students could be problematic since the process of personality consolidation during adolescence may not be identical across cultures. We expect that revision of certain items, such as those involving reverse scoring can lead to clearer patterns when assessing the structure of the FFM in this target population. The results provide important evidence against the practice of using adult personality measures on adolescents without separate psychometric validation. Future studies should address the scope of modifying FFM measures in order to make them valid and sensitive specifically for Indian school students.

ETHICS STATEMENT

The research project was submitted to the Cantonal Ethics Committee (Basel-Stadt and Basel-Land), which positively acknowledged the study protocol and informed consent forms but stated that the approval needed to be assessed by local authorities. We therefore also obtained the necessary permission from the respective school management trustees as well as the permission of school principals. Prior to data collection, written informed consent was obtained from participants in the age range of 17–18 years as well as parents of participants in the age range of 15–16 years. Also, the assent was obtained from participants in this age group of 15–16 years.

AUTHOR CONTRIBUTIONS

JG, BX, AM, and AW designed the study. AM, RK, BX, AW, and JG analyzed the data. JG, AW, and RK prepared the manuscript.

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Appendix B

Study II:

Thaiparambil, B. X., Waldmeier, A., John, R. K., Phil, M., & Gaab, J. (2018). Importance and impediments of education in India: Proposition of a merit-based and social-stratification insensitive approach. *Journal of Education and Social Sciences*, 6(2), 195-203.

(https://www.researchgate.net/profile/Boby_Thaiparambil/publication/316036390)

IMPORTANCE AND IMPEDIMENTS OF EDUCATION IN INDIA: PROPOSITION OF A MERIT-BASED AND SOCIAL-STRATIFICATION INSENSITIVE APPROACH

Boby Xavier Thaiparambil, MA;
Anja Waldmeier, MSc;
Roshin Kunnel John, MA,
M Phil;
Jens Gaab

ABSTRACT

Social stratification is a severe impediment for education in India and the current approach with reservation quotas is not effective and even diminishes the quality of education. The complex system of social stratification in India poses a sensitive context for education and requires particular consideration. Social stratification in India exerts its effect through both economical as well as social-psychological pathways, so a possible remedy needs to consider both of these mediators and their possible interactions. To counteract the possible detrimental effects of the social stratification in India, we propose that the current reservation systems should be revised from being merely grounded on class or caste affiliation to being merit- as well as income-based. Also, actions to foster social connections and the sense of belonging should be considered as a feasible and important measure to overcome psychological consequences of social-stratification in Indian education and to foster caste/class-insensitive education.

Introduction

One of the most important factors for societal and economic development is education. But while the assumption that “Education is a Nation’s Strength” (Shaguri, 2013) in general is undisputed, a mere equation of education or school attainment with development might seem unwarranted. In this regard, Hanushek (2013) stresses the importance of the schooling quality, which is harder to achieve than the provision of schooling infrastructure and access. From a historical perspective, the establishment and expansion of schooling is driven and influenced by the ideological as well as political context (Easterlin, 1981). Thus, not only do determinants of school quality and performance play a crucial role for education to drive societal and economic development – especially in countries and regions with improved school provision and attainment in face of a lagged economic development – but it can furthermore be assumed that there is a mutual dependency between education and societal development. Here, a focus on India is informative.

The Indian education system has a long tradition, which dates back to the Gurukula tradition and which was limited to the higher social strata of the society and was primarily focused on learning the sanskrit language and matters of religion. However, its current form is framed after the model of European education system (Kumar, 2017). From the colonial days, English language gained importance along with other languages and became, in the contemporary India, the single most important factor in higher education. At present, education is being governed by both central and the state boards in a parallel fashion. While India is considered a fast developing country despite its efforts to improve the education system, progress is still lagging due to a number of facts like poor infrastructure, inadequate faculty, poor quality of teachers and lack of financial resources (Government of India, 2015). Furthermore and importantly for India, a major issue that India faces today in the field of education has been the inequalities based on caste, ethnicity and gender (Shaguri, 2013). Thus, we argue that attempts to enhance the development of education in India is on the one hand substantially impeded by the detrimental effect of caste and social stratification, while on the other hand attempts to shelter its students from these influences would substantially enhance schooling quality. Therefore, the current scenario of Indian education system is examined in the light of the caste and class stratification and alternative pathways to handle their impeding effects on education are proposed. This entails an exploration of the influence of education on the sustainable development of the nation and the impact of social stratification and the current system of reservation on this process through the review of available empirical studies, position papers, newspaper articles and the education policy of the Government of India and United Nations. This is followed by the proposal of a merit based and caste/class insensitive approach as an alternative to overcome the impediments of the current system of education in India. Finally, limitations of the findings and implication for future research are discussed.

Socio-economic stratification in India

The Indian caste system can be defined as a system of social stratification, which divides the society into groups based on its members occupations and is closely associated with Hinduism (Berreman, 1972; Singh, 2009). For uplifting these disadvantaged groups the Government of India has transformed the traditional caste system into three classes, i.e. General Class, Other Backward Class (OBC) and Scheduled Castes/Scheduled Tribes (SC/ST). The major differences between caste and class are that the membership in the caste is given by birth and that caste is a closed group characterized by endogamy whereas class is an

open group. Also, in the class system vertical mobility is possible, such as a person can move higher and go down, whereas in caste there is no such mobility. Finally, a given class can be distinguished from another class on the basis of economic criteria such as income, occupation whereas caste are based on religious and mythical traditions and may have hereditary and traditional occupation (Laskar, 2010). But although the governmental classes are thought to replace castes and in consequence to eradicate caste-related discrimination, classes still represent basically the caste system, since class assignment is based on sub-caste affiliation instead of individual socio-economic status (De Zwart, 2000). Thus, the so-called untouchables (Dalits) are assigned to SC/ST, other socio-economically unprivileged castes, such as shudras are grouped into OBC (De Zwart, 2000) while members of the highest caste being assigned to General or Forward class (Chauhan, 2008). The OBC and General Class are assigned on the basis of socio-economical and education criteria from Hindu religion and the groups in other religions are also assigned to these classes. Accordingly, the Mandal Report noted that "in the traditional Indian society social backwardness was a direct consequence of caste status" (Government Of India, 1980 p.22, as cited in De Zwart, 2000).

As the result of Indian Constitution's interference in 1950 higher caste lost the privileges they enjoyed and the lower caste gained more attention from the government in favor of their right for equality (Chaturvedi, 2007; Galanter, 1963). Historically, caste affiliation determined the legal rights and obligations as well as secured the power of caste system to make rules for itself and constitute tribunals to enforce these rules, without being controlled by the government. However, the 1950 constitution of India put forward a new order with regard to castes in Indian society and the role of law for regulating it by personal law with law of uniform civil code, which assures equality in the society and made enforcement of disabilities a crime, punishable by imprisonment or fine.

In consequence and in order to reduce inequality in Indian society, the Government of India introduced counteracting or alleviating policies, such as the reservation system. Being basically a quota-based affirmative action, the objective of the Indian reservation system is to uplift social and educational opportunities for underprivileged communities. But although governmental policies set out to reduce the inequality and discrimination by reservation, it did not fully met its incentive (Mili, 2016). For example, The Times Of India (2014) pointed out that only 10% of eligible students have access to higher education in India and that the poor and deprived are still trapped in low quality of education. Also, according to the UNICEF report, lowest-caste children in India experience severe discrimination in education; which in turn has negative impacts on self-esteem and academic performance (Nambissan, 2009). Accordingly, the India Exclusion Report (2013-2014) states that "children who spend a greater part of the day in school, experience discrimination, neglect, active biases and prejudices, and ill-treatment from teachers and peers, (which) often results in a decision to drop out or frequently absent themselves from the schools" (India Exclusion Report 2013-2014) and a study conducted in Karnataka, south India on low class female students shows that they often face exclusion on the bases of caste and their poor academic performance (Bhagavatheeswaran et al 2016).

In India – and especially in urban areas – education has led to economic growth, created job opportunities and increased income and by thus helped people to rise above their birth and background. But in spite of all hopeful development, still the social order remains immutable and low caste are locked firmly into place by birth and governed by the rigid structure of social rules or as the New York Times put it: Caste is not past (The New York Times, 2013).

Education is humanity's best hope and most effective means in quest to achieve sustainable development (Praxling Samuelsson, 2008).

According to the UNESCO, education is at the root of sustainable development, impacting diverse areas of global importance, such as biodiversity, poverty reduction, gender equality, health promotion as well as peace and human security (United Nations Educational, Scientific and Cultural Organization, 2014). Therefore ensuring and improving education has been and still is a main stake in the United Nations Millennium Developmental Goals (Goal 2: Achieve Universal Primary Education, 2000-2015) and the current Agenda for Sustainable Development (United Nations Development Programme, 2016). But how does education lead to development in developing countries? In the following, examples of its wide effects are given.

First, education has profound effects on productivity. For example, Lockheed et al. concluded on the basis of a survey study in 18 low-income countries that four additional years of elementary education increases farm productivity up to average 7.4% (Lockheed, Jamison, & Lau, 1980). Also, a study conducted in Lao PDR indicates that primary or lower secondary education increases the chance of accessing the market of up to nearly 20% in farmers (Onphanhdala, 2009). Education also benefits equal distribution. Analyzing an international data set covering the last 30 years, it was shown that high educational attainment and equal distribution of education are important determinants of equal income distribution (Gregorio & Lee, 2002). In this regard, education has to be considered as a necessary social capital as the economic and social development is closely linked with higher education (Beissenova, Duisenova, & Muslimova, 2013). Again, this is of particular relevance for developing countries, since countries investing in higher education are associated with higher increases in labor productivity and long-term economic growth (Bank, 1994). To illustrate this, a study combining longitudinal data on changes in infrastructure and enrolment in Kazakhstan with qualitative focus group interviews showed that the education of a person is seen to be significantly related to future level of income and social status (Beissenova, et al., 2013). Furthermore, education exceedingly is interrelated to democracy through civic participations, such as voting and organizing (Glaeser, Ponzetto, & Shleifer, 2007). Education also impacts on reducing poverty. For example, a study conducted in India showed that post-elementary education has a significant role in reducing absolute and relative poverty by increasing agricultural development in rural areas that in turn boosts economic growth (Tilak, 2007).

But with regard to these positive effects of education, it needs to be acknowledged that although education requires a certain basic quantity in terms of infrastructure and numbers of teachers, it is quality of education that is essential for the economic

development of a country (Barro, 1996 ; Hanushek & Woessmann, 2007). For example, a study conducted in Madhya Pradesh (India) shows that the effects of schooling strongly depends on teachers skills and behaviors, such as the frequent use of black-board when teaching, an interaction-focused teaching style, giving and checking class and home works regularly as well as the revision of the previous lessons (Govinda, Varghese, & Carron, 1993). This is also reflected in current debates on quality-based education in India, such as teacher training and better learning facilities. In this regard Narendra Modi, Prime Minister of India stated "So far, the government's focus was on spreading education across the country. But the time has now come to shift the focus on the quality of education. Now, the government should emphasize more on learning rather than schooling" (The New Indian Express, 2016). Considering that the Indian economy strongly depends on number of education-sensitive factors, such as macro economic environment, quality of public institutions and technology, use of information and communication technologies, and innovation and technological adaption (Sreenivasulu, 2013), education needs to be considered a powerful and available instrument to shape a knowledge-based society in India (Ministry of Human Resource Development, 2008).

Determinants of education in developing countries

Considering that both the quantity and quality of education is important for development, what are the determinants of education, especially in developing countries? According to the United Nations, there are a number of decisive factors that influences education in developing countries, such as poverty, gender equality and health issues (United Nations, 2005). The importance of these factors will be exemplified with respect to the educational as well as the students' characteristics in the following.

First, there is a substantial relationship between the provision of adequate educational facilities and academic achievement. For example, a study conducted at Zimbabwe University reported that access to Internet is positively related to educational performance (Nyikahadzo, Matamande, Taderera, & Mandimika, 2013). Furthermore, a study conducted in Sokoto, Nigeria on the relationship between the school environment and academic achievement in higher secondary school shows that the teacher's experience enhances the competency in teaching and increases the output quality of the student (Aruwaji, not dated). Accordingly, a study conducted in Madhya Pradesh, India also points out that the facilities in the school and the quality of teaching, can have effects on the academic performance only when the students are effectively engaged in learning activities (Govinda, et al., 1993). Also, the ability to accommodate students according to their needs is another important factor in the academic achievement, as students placed in the age-appropriate class performed better in a study conducted in Nigerian schools (Abdullahi, Mlozi, & Nzalayimisi, 2015).

Furthermore and especially relevant for India, the question arises whether socio-economic factors have an influence on academic achievement. Farooq et al (2011) reasons that with regard to characteristics of the students and his background, socioeconomic as well as psychological factors exert a strong influence on education (Farooq, Chaudhry, Shafiq, & Berhanu, 2011). This is exemplified by a study conducted in Nigeria, showing that parent's visits to schools, pocket money, education of the parents, parent's occupation, residential type and family feeding positively affected student's academic performance (Abdullahi, et al., 2015). A study in private colleges in Rawalpindi and Islamabad, Pakistan further provides evidence for the importance of familial education, with communication skills such as fluency in English as well as support and guidance of students by their parents having an impact on academic performance of the students (Mushtaq, 2012). These results are in line with reports that the size of the family negatively influences the female attendance in schools in India, because as family becomes larger, elder daughters have to stay at home and carry out household matters (Jaychandran, 2002).

Consequential to these socioeconomic factors, psychological factors also play an important role on academic performance. Here, the relationship between self-esteem and school performance has been addressed in many studies, however with mixed results (Huang, 2011). While on the one hand the relationship between low self-esteem and poor school performance in general has been confirmed repeatedly (Bankston & Zhou, 2002 ; Harter, Whitesell, & Junkin, 1998), others have questioned causal role of self-esteem (Pullmann & Allik, 2008). For example, a study conducted among 10th grade high school students in United States noted that self-esteem only had a small effect on academic achievement (Bachman & O'Malley, 1986). However, recent studies conducted in developing countries highlight the reciprocal relationship between self-esteem and academic performance. For example, a study conducted among pre-university students of Qaemshahar, Iran shows that level of self-esteem is an important factor for academic performance as students developing high self-esteem also increase their academic performance (Aryana, 2010). Also, in another study conducted in Pakistan, Lahore shows that socioeconomic status has a significant impact on the students' performance in school, with higher self-esteem leading to higher study performance (Farooq, et al., 2011). Noteworthy, Vishalakshi et al. (2012) reported that high level of self-esteem brings a high level of confidence, which in turn improves academic performance among standard IX students from government and private schools in Mysore, India. Furthermore, they observed that self-esteem itself is strongly influenced by the socio-economic status of parents as well as a friendly and beneficial atmosphere of the schools (Vishalakshi & Yeshodhara, 2012). Another empirical study conducted in Kualampur, Malaysia shows that self-esteem is one of the key factors that influence students' academic performance with students displaying higher self-esteem performing better in their academic matters (Rosli et al., 2012). This is supported by a study conducted in Haryana, India among 175 higher secondary students, study shows that there is a positive and significant relationship was existing between self-esteem and family environment and found no significant relationship between self-esteem and socio-economic status (Singh & Bhatia, 2012) Also, a study conducted in Raipur, Utter Pradesh, India reported that students from low-income families, i.e. with less than 50'000 Rupees per year, have less self-esteem in comparison to those from families with higher, i.e. 1'00'000 Rupees and above (Mahapatro, 2016) and a study conducted in Rajkot, Gujarat, India among college students found that students with high economic status have higher self-esteem than students with low economic status (Parmar, 2014). Also, a quantitative and qualitative study conducted in India among college students between 18 to 23 years of age shows that academic pressures, understood as expectations of the parents, teachers and the students themselves, exert a negative influence on self-esteem (Jain & Dixit, 2014). These findings reflect the context-dependency of self-esteem, which is often formed around familial, work-related and organizational experience (Pierce & Gardner, 2004; Pool, Wood & Leck, 1998).

With regard to the statement that “self-esteem occurs not simply as a result of knowledge of one’s location in a status hierarchy but, more important, as the result of the frequency with which one is reminded of that location” (cited from Faunce, 1989, page 378), the relevance of social stigma needs to be addressed. The Indian Express, considered the leading Indian newspaper, reported that – 66 years after officially banning caste discrimination – the Indian school education system still is in the clutches of caste discrimination as SC/ST children are often discriminated from other students (The Indian Express, 2012). To complete this picture, The Hindu (2012) reports that high-caste Hindu students are often seated separately from low-caste students in classrooms, which creates an intimidating atmosphere among low caste students, and a recent report in NDTV (New Delhi Television Limited) concludes that caste discrimination happens even in higher education as well as in PhD studies (Press Trust of India, 2016). As a consequence, Geetha Nambissan, Professor of Sociology and Education in Jawaharlal Nehru University, New Delhi argued in a UNICEF report that “(...) these experiences are detrimental to children’s self-esteem and self-worth (...) and likely to have serious implications for their interest and motivation in studies (Nambissan, et al., 2009).

Reservation: An effective way to improve education?

As shown above, education is an important factor for developing countries, impacting on growth of the economy, agriculture and equal distribution of the income (Shaguri, 2013). This is especially true for India, where education has been identified as one of the main contributors of economy development (Sreenivasulu, 2013). However, while quantitatively India is inching closer to universal education, the quality of its education is still questioned and by large influenced by socio-economic factors, such as education of the parents, income of the family and healthy, safe, protective and gender sensitive school environments (Sadig, 2000). Thus, these socio-economic factors are both impediments as well as possible stepping-stones for the improvement of education in India.

As mentioned above, the Indian caste system is a system of social stratification, which is closely connected with Hinduism and which divides society into groups based on its members’ occupation (Berreman, 1972). But even though the Government of India in 1950 has abolished the traditional caste system and introduced governmental classes (see above), the caste system still acts as a hidden separator, since class assignment is based on sub-caste affiliation instead of individual socio-economic status (De Zwart, 2000). To counteract the negative discrimination and to uplift the social status of the lower castes – which is especially dire for those considered as born out of the Varna (Sanskrit for caste) scheme, i.e. the Dalits or untouchables – the Indian government began to implement protective measures through reservation quotas in higher education such as university studies and in government jobs for socially, educationally and economically backward castes (Department of Higher Education, 2016) This measure is anteceded by cost free education for the low-class students from 1st to 12th class, thus from 6 to 14 years of age (Ministry of Human Resource Development, 2016). Along with these reservation quotas, the Government of India also offers education loans and full financial support for the low-caste students (Ministry of Social Justice and Empowerment, 2016). But is this positive discrimination effective and/or sufficient?

The recent report in The New Indian Express states that only a small percentage of SC/ST and OBC members are enjoying the provisions of the reservation system, while the majority of the low caste members still suffers the consequences of their low social status (The New Indian Express, 2014). With regard to education, positive discrimination does not appear to make a substantial impact for members of lower class or caste. For example, a survey study conducted in India showed that Dalits and Tribes do not benefit from this positive discrimination, with no improvement on education and even a decline of college graduation rates among Dalits (Desai & Kulkarni, 2008). Also, a study on the the impact of positive discrimination in India in targeted groups found that the reservation system does not help students from low governmental classes, but that improvements in education is rather more a consequence of a general improvement of the supply of schooling (Cassan, 2011).

To ensure the exclusive provision of affirmative actions for those in need, the Government of India introduced the so-called creamy layer in 1992, stating that the relatively wealthy (i.e. 1’500’000 Rupees per annum) and better educated members of the OBC and ST/SC castes are not eligible for the government sponsored educational and professional benefit program. However, this restriction of benefits might only be consequential for the recipients, but not for the aim itself, since there is no evidence that the creamy layer disproportionately benefits from the affirmative action program of the government at the cost of their lower counterparts (Desai & Kulkarni, 2008).

Besides the lack of benefits on educational outcome, the reservation system has wider consequence on education. In order to ensure access for reservation group in colleges and universities, marks needed by eligible students are lower than those of higher classes (Robert, 2013). With regard to this, Mehbubul Hassan Laskar – Adovocate at the Supreme Court of India – assumes that “to sympathize whimsically with the weaker sections by selecting sub-standard candidates, and that also in the higher level of education, is to punish the society as a whole by denying the prospect of excellence” (Laskar, 2010).

Consequently, it has been argued that reservation quotas in the long run affect the quality of Indian education. For example, reservation neglects people’s ability and intellect directly as it allows people with lesser marks and lesser quality to get admission for higher education. The admittance of students with lower quality thus reduces quality of education, since higher education needs high skills, proficiency and excellency. According to Laskar (2010) the demerits of the reservation system are twofold. First, it impedes of the development intellectual abilities of the low caste, because it creates a less competitive spirit among the students from backward class. Second, the reservation system prevents the progress of the nation, since it pulls away the meritorious students from higher education. Thus, the reservation sytem dishonours the right of the meritoius people to get admission for higher education or job because reservation system does not recognize fair competition (Anita, 2014).

Merit-based and social stratification-insensitive education: A proposition

Given that social stratification is a severe impediment for education in India and that the current approach with reservation quotas appears not to be effective and could even diminish the quality of education, there is need for improvement. Therefore, we propose a different approach. Social stratification in India - regardless of being based on governmental or religious classifications - exerts its effect through both economical as well as social-psychological pathways, so a possible remedy needs to consider both of these mediators and their possible interactions. In the following, our proposition will be described, borrowing on the experiences and approaches in similar settings.

First, we consider reservation quotas to ensure educational access for members of lower social strata to be ineffective with regard to its aims as well as counterproductive for the improvement of the quality of the Indian education system. Here, a merit-based approach with income-sensitive financial support seems warranted. This merit-based approach has empirical support. For example, a study conducted among nursing students between 15 to 25 years of age in Karachi (Pakistan) finds that entry qualification was significantly related to academic performance (Ali, 2008). While this supports a merit-based admission approach, it raises the question whether this would systematically exclude students of low-income families from the educational system in India. In support of this concern, (Sadana, 2009) points out that in India, 13% of the children from rural areas do not attend school due to the lack of affordability. Furthermore, a study conducted in rural Indian states (Bihar, Kerala, Andhra Pradesh, Uttar Pradesh, Rajasthan and Madhya Pradesh) indicated that schooling costs for students are too expensive for low-income families and in consequence, poor families either fail to register their children or withdraw them prematurely from primary schools (Jayachandran, 2002). As described above, in India cost-free education is provided for all students until 12th class, so that primary education as well as the first part of the secondary education are provided at no schooling costs. However, from higher secondary, thus 11th and 12th classes, as well as for higher education, i.e. university and college, reservation quotas exist for students based on their socio-economic backwardness, but not on school marks or academic performance. In order to tackle both the social as well as the economic aspect of aforementioned problem, we agree with Laskar (2010) and propose a restructured reservation system in higher education which would be based on the backwardness, i.e. family income, geographical accessibility for schooling, and the academic quality of the student, i.e. her or his school marks and academic performance. Importantly, there are examples that this is possible and effective. For example, The Indian Express - a leading newspaper in India - reported that the State of Maharashtra, India provides scholarship to low-caste/low class students for higher studies based family income and school marks of the student, empowering members of lower castes/class and in turn increasing the quality of education (The Indian Express, 2016).

Second, the Indian education is very sensitivity to social stratification. As Jiloha - a psychiatrist in New Delhi - stated, "deprived caste students who are in want of social approval and acceptance, carry high levels of social anxiety as compared to general population students. This anxiety interferes with their work efficiency resulting in poor performance" (Jiloha, 2007). Thus, although the caste system was officially abolished in 1950, Indian education still appears to be under the bondage of the caste system. But since it needs to be acknowledged the overcoming the social-stratification in India appears a rather elusive goal, we propose a social-stratification insensitive education system for India as a mean of meanwhile mitigation. Here, recent research on social connections and its application are highly informative.

The basic assumption in this regard is that social-stratification insensitive education thrives on social connections and when the sense of belonging is encouraged in schools. This is exemplified by studies among young and adolescent students in Australia and India, showing that social support, belongingness, friendship and optimism are important determinants of well-being and happiness in adolescent students (O'Rourke & Cooper, 2010 ; Sharma & Malhotra, 2010). Also and importantly for the focus of this proposition, positive social interactions, such as a birthday party with peers, enhances the achievement motivation (Walton, Cohen, Cwir, & Spencer, 2012). Thus, measures to foster social connectedness or belongingness are possible cornerstones of a caste/class-insensitive education system.

A series of large and prospective studies in US-American universities are highly informative in this regard. Based on the observation that the stress arising from the feared confirmation of as well as the affiliation to negative stereotypes comprises the academic performance in minority students, Cohen et. al. (2006) conducted two controlled double-blind prospective studies conducted among African and European American university freshmen. The intervention under investigation was based on the reaffirming the self-integrity. Therefore, students were given a list of values such as relationship with friends or family and asked to choose their most important values and to write a brief paragraph about why these were important to them. In order to reinforce their choice, students were furthermore asked to state their level of agreement with the declaration regarding their chosen values such as "I care about these values". Noteworthy, this brief writing-assignment intervention improved academic grades in African-American students and considerably reduced the racial achievement gap in the short as well as in the long-run (Cohen, Garcia, Apfel, & Master, 2006; Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski, 2009). The major finding indicates that lessening the psychological threat of being confirmed as a member of a minority is possible by a circumscribed psychological intervention.

Following a similar approach, Walton and Cohen (2011) expanded their previous findings with an intervention aiming to enhance belongingness in otherwise socially stigmatized students, who are unsure of their social belonging in mainstream institutions. Again, using African-American and European-American college students, the participants in the intervention underwent an intervention to increase the sense of belonging. Therefore, students were provided with the perspective that the experienced social hardship in the academic setting is of short duration and shared amongst all students. Thus, the aim of the employed intervention was to encourage students not to attribute experienced personal and social problems to stable deficits of themselves or their ethnic group but to shared, short-lived and passing consequences of starting their university studies. In the intervention process participants were asked to read a report of seemingly true results of a survey amongst senior students. Most of the students in the survey stated that they had worried about whether they belonged in college during the difficult first year,

but gradually grew confident in their belonging as the time passed. The concerns they had about belonging were thus characterized as common at first and as momentary because of the challenging nature of the college. The participants were asked to internalize this perspective and to write an essay describing how their own experience in college resounded the experiences summarized in the survey report. Their essays were further read and captured on video as participants were informed that it would be publicized to future students so that it may help them to ease their transition to college. This short and well-accepted intervention helped students to reframe their social self-perception and not only raised academic performance of the African-American students steadily and persistently over the 3 years assessment period – cutting the race gap in academic performance by 79% in the final year – it furthermore also improved health in African-American students to the point of eliminating the otherwise observed race gap in self-reported health (Walton & Cohen, 2011).

Although it needs to be noted that these results were obtained in the US-American university setting and thus the employed interventions still need to be tested in different settings and circumstances, we assume that similar strategies could be of use to facilitate a caste-insensitive education system in India. Already, the Indian education system and its academic curriculum offers extracurricular activities such as vocational class, personality development and motivational classes and Government provides financial support to aided and Government-run schools, which could provide a suitable setting for similar approaches (Cheney 2005).

Conclusion

A functional and effective educational system is of crucial importance for the economic as well as societal development of India. The present study explored Indian education system with regard to possible effects of governmental class and caste stratification. Our analysis on the basis of a differentiated discussion of various resources shows that the success and quality of education is impeded by India's culturally imbedded social stratification. The current strategy of the Government of India to tackle the issue is based on a reservation system, which is basically a quota-based affirmative action and thus grounded on backwardness of the caste rather than the quality and family income of the student. With regard to the aspired and actual effects, an unwelcomed mismatch of low benefits for members of low-castes and the risk of reducing the quality of education for all has to be noted (Laskar, 2010).

The cultural richness of India and its complex social stratification poses a very sensitive context for education and thus requires particular consideration. To counteract the possible detrimental effects of the social stratification in India, we propose both structural as well as psychological measures. With regard to the former, the current reservation systems should be revised from being merely grounded on class or caste affiliation to being merit- as well as income-based. Second and with regard to the latter, approaches and actions to foster social connections and the sense of belonging should be considered as a feasible and important measure to overcome psychological consequences of social-stratification in Indian education and to foster caste/class-insensitive education. Our proposition of a merit-based and social stratification-insensitive education thus covers academic, economic as well as psychological perspectives. We humbly acknowledge that these ideas are far from new. Mahatma Gandhi, spiritus rector of modern India, himself reframed the denied dignity of the low-caste by naming them Harijan (Child/People of God), a word coined by Gujarati Poet Narasimha Mehta. Also, Gandhi pointed out that "by education I mean an all-round drawing out of the best in the child and man in body, mind and spirit" (M. K. Gandhi, Harijan, July 31, 1937), so the Gandhian vision on education was clearly focused on quality. If India is to become a developed country, it needs to temper and abrogate the sensitiveness its educational system for social stratification.

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Boby Xavier Thaiparambil, MA;
Division of Clinical Psychology and Psychotherapy,
Department of Psychology, University of Basel

Anja Waldmeier, MSc;
Division of Clinical Psychology and Psychotherapy,
Department of Psychology, University of Basel

Roshin Kunnel John, MA,
Division of Clinical Psychology and Psychotherapy,
Department of Psychology, University of Basel

M Phil;
Division of Clinical Psychology and Psychotherapy,
Department of Psychology, University of Basel

Jens Gaab
Division of Clinical Psychology and Psychotherapy,
Department of Psychology, University of Basel

Appendix C

Study III:

Kunel John R, Xavier B, Waldmeier A, Meyer A and Gaab J (submitted) The Governmental Ranking of Class and the Academic Performance of Indian Adolescents.Submitted in PLOS ONE.

THE GOVERNMENTAL RANKING OF CLASS AND THE ACADEMIC PERFORMANCE OF INDIAN ADOLESCENTS

Roshin Kunnel John^{1*}, Bobby Xavier¹, Anja Waldmeier¹, Andrea Meyer², and Jens Gaab¹

1 Division of Clinical Psychology and Psychotherapy, Department of Psychology, University of Basel

2 Division of Developmental and Personality Psychology, Department of Psychology, University of Basel

Correspondence:

Roshin Kunnel John *

roshin.kunneljohn@unibas.ch

Keywords: Governmental Class¹, Caste Affiliation², academic performance³, Self-Esteem⁴, life satisfaction⁵, Indian adolescents⁶

Abstract

Social and economic factors are commonly examined as contextual variables that predict academic achievement, apart from the educational environment. In India, a major segment of the socioeconomic status of students comprises the governmental stratification of population into three broad classes, viz., scheduled castes/tribes (SC-ST), other backward classes (OBC) and general class (GC). In this study, we examined the association of these governmental classes with the academic performance of Indian adolescents who enjoy the same school environment. Psychological measures of self-esteem and life satisfaction as well as demographic variables such as gender, age and family income were also examined as covariates. The study was conducted on a convenient sample of 858 students of X and XI grades. Based on multilevel regression models, the relationship between governmental classes and academic performance was significantly positive, wherein higher level of class predicted better academic performance. The study highlighted that students from the same school environment performed differently based on their social status and that this difference was not a function of their family income, thus pointing to potential role of non-economic aspects of the governmental stratification including caste affiliation. The findings indicate the need for further examining as well as planning to improve the aspects of students' social status that impact academic performance.

Introduction

India's educational system has the context of a complex social fabric of casteist, religious, and regional diversities and hierarchies. Although the Indian constitution of 1950 eradicated the caste system, inequalities based on caste by birth has continued to hinder the national development (NAOREM, 2013; Sonaldeb Desai, 2010). With the aim of uplifting the disadvantaged groups, the government of India has grouped the traditional caste system into three classes, i.e., General Class (GC), Other Backward Classes (OBC) and Scheduled Castes/Scheduled Tribes (SC/ST). But although these governmental classes are thought to replace castes and thus to eradicate caste-related discrimination, they still represent basically the caste system, since class assignment is based on sub-caste affiliation, as opposed to individual socioeconomic status (Jodhka et al., 2015; Zwart, 2000). Although the right to free and compulsory education for all children aged under 14 years is constitutionally guaranteed and was strongly advocated in the Right to Education Act (Development, 2014; India, 2009), substantial inequality in education and employment still exists and family income is strongly influenced by caste and ethnicity (KULKARNI, 2008). Students belonging to low-castes are exposed to various forms of daily humiliation, exploitation and exclusion in the schools (Fárek, Jalki, Pathan, & Shah, 2017; NAOREM, 2013; Sukhadeo Thorat, 2007).

The impact of socioeconomic status on educational outcomes is an important concern in educational research (Sirin, 2005; Thomson, 2018; White, 1982). Studies have consistently shown that socioeconomic status of parents as well as family distress significantly influences student's overall academic achievement (Anwar, 2013; Haroon Sajjad, 2012). Sirin (Sirin, 2005) conducted a meta-analysis of studies on the relationship between academic achievement and socioeconomic status, and included 74 independent studies comprising 101157 students and 6871 schools. A strong positive relation was found between socioeconomic status and academic achievement. School location and social status as minority were found to be the major influences on this positive relation. In the Indian context, caste affiliation along with the financial condition of the family constitutes a major part of students' socioeconomic background (Boby Xavier Thaiparambil, 2017 Feb; Chopra, 1967 April; Kunnel John, Xavier, Waldmeier, Meyer, & Gaab, 2019). In fact, caste affiliation may determine to some extent the socioeconomic status of the family (R.K. Adsul and Vikas Kamble and Smt. K.W. Mahavidyalaya, 2008 July; Sirin, 2005; White, 1982). Alternately, the associated socio-economic status may determine academic achievement, irrespective of caste/class affiliation.

A few Indian studies have examined the role of caste status on academic achievement (e.g.) (Kamat, 2008 May; Sekhri, 2010 Oct; Surendrakumar Bagde, 2015 Dec). Yadav and Chahal (Chahal, 2016 July) observed that there was no significant difference of academic achievement between high and low caste students of secondary school. Sinha and Mishra (Mishra, 2014 May) observed that social class-based identities especially linked to parental education did not determine academic achievement of Indian students. However, other studies observed that educational and occupational status of parents influence their academic achievement (e.g.) (Chopra, 1967 April; Dr. Sunita Singh, 2016 March). Whereas (Sekhri, 2010 Oct) found that integrated college environment of higher and lower castes was unhelpful for academic achievement of both groups, Bagde et al (Surendrakumar Bagde, 2015 Dec) affirm that studying together did not have a negative impact on academic performance.

Also, self-esteem and life satisfaction have been found to impact academic performance (Daraei & Mohajery, 2012; Fors Connolly & Johansson Sevä, 2018; Rahmani, 2011; Rosli et al., 2012). There is evidence for a reciprocal association between self-esteem and academic achievement (Alves-Martins et al., 2002) as well as life satisfaction and academic achievement (Ng et al., 2015). Though Indian studies have examined self-esteem and life satisfaction in the context of educational outcomes, there is a lack of research linking these variables to the governmental stratification of the three classes in the context of academic performance. Besides, the association between academic performance of Indian adolescent students and their governmental class has not been examined in any published Indian study.

We therefore set out to investigate the association between governmental class and academic performance in Indian school students controlling for demographic variables such as family income, gender, and age, and psychological variables of self-esteem and life satisfaction.

Materials and Methods

We used a cross-sectional study design to examine the association between governmental class and academic performance. Based on the review of literature, we assumed that the governmental class would be associated with academic performance and that family income, self-esteem and life satisfaction would be covariates.

Participants

The study was conducted on a sample of 858 students from the states of Kerala in South India, and Madhya Pradesh, in North India. The participants were in the age range of 15-18 years Mean age=16.45 and (SD) .78. There were 405 male and 453 female participants. The detailed description of the study sample is given in Table 1.

Table: 1 Participants' Demographic information: Frequencies/Percentages

		Full Sample N/%	Individual Schools N/%					MP3:
			KL1:	KL2:	KL3:	MP1:	MP2:	
			105/12.2	236/27.5	247/28.8	123/14.3	25/2.9	122/14.2
Gender	Male	405/47.2	57/54.3	123/52.1	139/56.3	0/0	23/92	63/51.6
	Female	453/52.8	48/45.7	113/47.9	108/43.7	123/100	2/8	59/48.4
Govt.	SC-ST	68/7.9	1/1.0	39/16.5	12/4.9	4/3.2	0/0	12/9.8
Class	OBC	370/43.1	84/80.0	93/39.4	168/68.0	12/9.8	6/24	7/5.8
	GC	420/49.0	20/19.0	104/44.1	67/27.1	107/87.0	19/76	103/84.4

The participants were recruited from the X or XI grade students from six schools. From each randomly selected division of grade X or XI in each school, all the students in the division were included, which would minimize selection bias. These schools were selected with the aim of incorporating urban and semi-urban population where all the three governmental classes are relatively more likely to be represented in a school. For the same reason, either rural or metropolitan schools were not included. However, the three governmental classes were not proportionately distributed across the schools (Table 1). The lowest class (Scheduled Castes/Scheduled Tribes, SC/ST) was poorly represented in some schools. In the overall sample, there was a higher representation of General Class (GC) (i.e., 49%, with a proportion of 31% in India) and lower representation of SC-ST, as compared to their proportion in the Indian society (8%, with a proportion of 28% in India), whereas the percentage of Other Backward Classes (OBC) in our sample was close to their actual proportion in India (43%, with a proportion of 41% in India) (India, 2018, Sep).

Measures

The students' governmental class was obtained from the school registers, which record this to allow class-based reservation quotas. Students' level of academic performance was obtained from the exam-results from the school authorities. The participating schools from MadhyaPradesh followed CBSE syllabus (Central Board of Secondary Education) and Kerala schools followed State Board of Education (SBE). The XI grade students were recruited from two different streams, i.e. science and commerce. To get comparable results, grades as well as percentages of achieved points were transformed into z-scores. Individual mean z-score across all exams for each student was calculated as indicator of academic performance. Parents' monthly income was used as a proxy for socioeconomic status. The income of an Indian middle-class family with 2-3 earning adults broadly ranges between Rs 20000 to Rs 50000 (A. Roy, 2018; Vanneman, 2010). Students reported parents' monthly income on a five-point measure ranging from 1 to 5, where 1 =<5000 Rupees per month (which correspond to the lower class family income); 2=5000–20000 (lower middle class); 3=20000-50000 (middle class); 4=50000–100000 (upper middle class); and 5=>100000 Rupees per month (upper class) (A. Roy, 2018; Vanneman, 2010). Self-esteem was assessed with the 10-item Rosenberg Self-Esteem Scale, a commonly used and well-validated measure of self-esteem (Robins, Hendin, & Trzesniewski, 2016; Rosenberg, 1965). Responses were measured on a 4-point scale, ranging from 1 ("strongly disagree") to 4 ("strongly agree"). Satisfaction with Life Scale (SWLS) (Diener, Emmons, Larsen, & Griffin, 1985) was used as a measure of participants' global cognitive judgment of life satisfaction. In this 5-item scale participants indicate how much they agree or disagree with each item on a 7-point scale that ranges from 7 ("strongly agree") to 1 ("strongly disagree").

Procedure

The research project was submitted to the Cantonal Ethics Committee (Basel-Stadt and Basel-Land), along with the previous study (Kunzel John et al., 2019); which positively acknowledged the study protocol and informed consent forms, but which also required the necessary permission from the respective school management trustees as well as the permission of school principals, which was then obtained in subsequent. Prior to data collection, written informed consent was obtained from participants in the age range of 17-18 years as well as parents of participants in the age range of 15-16 years. Also, the assent was obtained from participants in the age range of 15-16 years. The assessments were administered during

school hours and in classrooms. Students were given 30 minutes to complete the assessment. Overall, 883 students were recruited. Of these, 25 had to be eliminated due to unknown governmental class.

Statistical Analyses

To test our hypothesis, we used multiple linear regression and multilevel models. Multiple linear regression models were used to assess school specific relationships between the factor caste affiliation and school performance, thereby controlling for student's sex, age, family income, self-esteem, and life satisfaction. Thus, separate regression models were run for each of the six schools. A multilevel model was then set up to assess the relationship between caste affiliation school performance and for all six schools combined, again controlling for the above mentioned five covariates. This model contained a random intercept.

Results

The average academic performance varied among the six schools (likelihood ratio=230.0, $p < .001$) with values ranging between 37.6 (KL1) and 63.2 (MP1). Descriptives of the demographic variables and the measures for our sample are given in Tables 2 and 3. The intra-school correlation for academic performance was 0.32.

Table2: Descriptives: Academic performance, self-esteem and life satisfaction Mean (SD)

	AP	SES	SWLS
Total: N=858	48.5 (16.2)	18.1 (4.2)	21.5 (6.0)
Male: n=405	42.3 (15.7)	18.2 (4.0)	21.4 (5.8)
Female: n=453	53.9 (14.5)	17.9 (4.2)	21.6 (6.2)
SC-ST: n=68	44.5 (16.1)	17.1 (3.3)	21.5 (6.5)
OBC: n=370	43.0 (14.7)	19.1 (4.4)	21.0 (5.9)
GC: n=420	53.8 (15.7)	17.3 (3.9)	22.1 (6.0)

AP: Academic performance, SES: Self-Esteem Scale & SWLS: Satisfaction with Life Scale

Table 3: Frequencies (Percentages) of Income and Govt.class

Income	GC	OBC	SC-ST	Total
Below 5000	79 (19)	89 (24)	23 (34)	191
5000-20000	137 (33)	179 (48)	21 (31)	337
2000-50000	135 (32)	68 (18)	16 (24)	219
50000-1 lakh	65 (16)	22 (6)	06 (9)	93
above 1 lakh	04 (1)	12 (3)	02 (3)	18
Total	420	370	68	858

Multilevel analysis revealed significant differences in academic performance among the three governmental classes, when considering all schools together ($F_{2,845}=5.73$, $p=0.003$). Predicted school performance values were 45.5 (± 3.6), 49.1 (± 3.3), and 51.4 (± 3.3) for low, medium and high-class levels respectively, and were thus increasing with increasing levels of governmental class.

Assuming a linear functionality between governmental classes and academic performance, we obtained a positive association ($\beta=2.71$, $SE=0.78$, $t=3.46$, $p<0.001$), i.e. the higher the class level, the better was the academic performance (Table 4).

Table 4: Regression coefficients of multilevel model with governmental class as continuous predictor (assuming a linear relationship) and academic performance as outcome, controlling for family income, gender, age, self-esteem, and life satisfaction.

Intercept	value	Std.error	DF	t-value	p-value
Govt.class	2.71	0.78	846	3.46	0.006
SES	0.36	0.12	846	2.93	0.003
SWLS	0.09	0.08	846	1.16	0.244
Sex	8.29	1.00	846	0.28	0.000
Income	0.35	0.52	846	0.67	0.49
Age	0.02	0.61	846	0.04	0.96

SES: Self- Esteem Scale & SWLS: Satisfaction with Life Scale

Table 5: Regression coefficients from linear regression models with governmental class as continuous predictor (assuming a linear relationship) and academic performance of individuals as outcome, controlling for family income, gender, age, self-esteem, and life satisfaction. A separate model was run for each of the six schools.

School name	Term	Estimate (β)	Std.error	statistic	p.value
KL1	Gov.rank	0.1461	2.684	0.05444	0.9567
KL2	Gov.rank	5.123	1.227	4.173	4.263e-05
KL3	Gov.rank	-1.206	1.682	-0.7173	0.4739
MP1	Gov.rank	1.733	2.074	0.8354	0.4052
MP2	Gov.rank	6.022	7.705	0.7815	0.4447
MP3	Gov.rank	0.7158	1.909	0.3755	0.708

Multiple regression analyses for the association between governmental class and academic performance of individual schools revealed the following pattern. In one school (KL2), academic performance was highest in the highest class (GC) and lowest in the lowest class (SC-ST) ($p < .001$) while in another school (KL3), academic performance also varied among classes, albeit being lowest for the medium class (OBC) ($p = 0.014$). For the remaining four schools, no significant differences in academic performance among the three class levels were found ($0.33 \leq p \leq 0.70$) (Figure 1). Assuming a linear functionality between governmental classes and academic performance, we found a positive association for one school (KL2: $\beta = 4.12$, $SE = 1.23$, $t = 4.17$, $p < 0.001$) where the students showed increasing academic performance with increasing class levels. For the remaining five schools, a significant pattern of association was not found (Table 5).

Discussion

In this study, we examined the three Governmental classes namely, SC-ST, OBC, and GC, with respect to their association with academic performance in Indian adolescent students of grades X and XI while controlling for age, gender, family income, self-esteem, and life satisfaction. Results based on multilevel regression analysis showed that lower class was likely to be associated with low academic performance. The association between social class and academic performance is a consistent finding in studies with ethnic minorities from low socio-economic status (Battle & Lewis, 2002; Considine & Zappalà, 2016; Niles, 1981 Oct; Sirin, 2005). For instance, in a meta-analytic review of research, Sirin (Sirin, 2005) observed that minority students performed poorly as compared to their non-minority peers on account of important factors such as low family income, poor parental education and the influence of being in the neighborhood of low social status.

It is interesting to observe that the students' governmental class predicted their academic performance, while controlling for their family income. In a study that examined how social and economic disadvantage influenced school performance, Considine and Zappalà (Considine & Zappalà, 2016) observed that the 'social' and the 'economic' components of the socioeconomic status may have distinct and separate influences on academic performance. Class-caste affiliation is an important aspect of the socioeconomic status of Indian students. It is a complex mix of the 'social' and the 'economic', where the caste is more to do with social status and the class is to do with economic status. Broadly speaking, the three governmental classes may correspond to the higher (GC), the middle (OBC), and the lower social classes (SC-ST). However, the association between the three classes and family income was rather complex. More students from the lower classes (especially the SC-ST) reported low family income ($< 5,000$ rupees or $5,000 - 20,000$ rupees per month) when compared with the higher class (Table: 3). But, a relatively higher proportion of the lower classes (especially OBC students), as compared to GC, reported very high family income (above 100,000 rupees per month). Thus, family income did not seem to correspond to social hierarchy at least in the case of very high-income families. Also, an increase of family income may not necessarily correspond to better educational outcomes for the students of low social class. In other words, the educational disadvantage that we observe in our results in the lower governmental class, may not be equated with economic disadvantage.

The factors that influence academic performance may be diverse and complex for all the numerous subgroups placed under the three governmental classes. Some of the social subgroups under OBC category have high economic prosperity and respectable social status in some states/districts of India. In a study

(Teena Yadav, 2016) conducted in the state of Haryana in which students from a socioeconomically advanced OBC subgroup were included, the academic performance of these OBC students was found to be on par with the General Class. Hence, the differential influence of governmental class for students from socially backward families which are economically advanced needs to be examined in the Indian context. Another important factor that may have influenced the students' academic performance is English as medium of study. Students from the lower classes are much more likely to come from families with parental lack of education and lack of proficiency in English language.

Findings of this study are based on data from only two Indian states and three schools from each, where all the students from the randomly selected division of the X or XI grade participated as a sample cluster. These schools were heterogenous with respect to the proportion of students from the three governmental classes who studied in the division of X or XI grade that was sampled. However, it needs to be noted that our sample points to the actual ground reality of the presence of students from these three social classes at the level of high school and higher secondary school in the private sector schools which generally provide better quality education in India.

We examined students from the three governmental classes who study in the same school environment. We found that students who belong to the lower-class lag behind in their academic performance when compared to the students from the higher class even when they study together the same subjects in the same classroom. However, this pattern was not observed consistently across the individual schools in our study. (Thomson, 2018) observed that students from lower socioeconomic status are likely to have a positive influence when they study along with students of higher socioeconomic status and are likely to perform better academically. This would imply that the gap in academic performance between students from higher and lower governmental classes are likely to widen if students from the schools of the governmental sector and from the rural background are investigated.

In this study, we examined academic performance of Indian adolescents who studied in the same school environment but belonged to the three ranks of governmental class, SC-ST, OBC and GC. Multilevel regression indicated that higher class predicted better academic performance when controlled for age, sex, income, self-esteem, and life satisfaction. However, results based on separate student clusters from the schools were inconsistent. Though we used a sizable overall sample, there must be caution in generalizing the findings based only on a few schools, especially since the sample was heterogenous with respect to the representation of the three governmental classes in each school. Since we controlled school environment by selecting all students in a class-room, it is likely that other factors of the family and social environment may have contributed to the outcome, especially those linked to social status, such as parental education, neighborhood influence, and caste-related perceptions and experiences. Hence, future studies need to explore the factors and processes by which social status impacts academic performance.

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Appendix D

Curriculum Vitae:

Roshin Kunnel John

roshin.kunneljohn@unibas.ch