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Sibling attachment inventory for senior secondary school students: standardization in Indian context

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ABSTRACT

The study aimed at exploring, confirming, and validating the factor structure of sibling attachment inventory (SAI) within the Indian cultural context. The hypothesis posits that SAI will show reliable sibling attachment measures, evaluating its psychometric properties with 250 students enrolled in Class XI within govt and private schools, selected through stratified random sampling across 10 districts of Delhi. The research unfolded in three phases: i) data collection utilizing original 25-item SAI; ii) data purification and analysis using SPSS version 23.0; and iii) verification of the factor structure through factor analysis employing principal component analysis (PCA) with varimax rotation and confirming the factor structure using AMOS. The results revealed inclusion of 23 items across three factors viz. trust, communication, and alienation, with high reliability coefficients (α) of 0.954, 0.786, and 0.621 respectively. Preliminary analysis demonstrated commendable internal consistency. This study highlights the importance of considering sibling relationships in understanding adolescent well-being, thereby addressing existing research gaps by focusing on sibling relationships among adolescents, an area often overlooked in favor of parental and peer dynamics. Thus, SAI can support the assessment of sibling-adolescent attachment, thereby helping to enhance intervention, and expanding attachment research scope beyond traditional family dynamics.

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1. INTRODUCTION

Sibling relationships are highly unique and bear strong influence on adolescent social adjustment and wellbeing. This impacts relationship formed and maintained during later adulthood [1]. Most research studies focus on exploring parent, peer, and youth attachment relationships, while sibling-adolescent relationships are mostly overlooked and ignored [2]. This dearth of studies is more prominent for sibling-youth relationships especially during late adolescence and adulthood. Tibbetts and Scharfe [1] studied the influence of sibling attachment on sibling conflict and cooperation revealing that such relationship patterns strongly influenced conflict and cooperation among siblings after controlling for parental and peer attachment. Their study found that the presence insecure sibling attachment predicted increased rate of sibling conflict and reduced cooperation.

Wilkinson [3] highlighted how diverse attachment relationships influenced the mental and physical well-being along with self-esteem among adolescents differently in a sample of 615 students studying in high school. Research by Feng *et al*. [4] have noted a conspicuous paucity of high-quality research addressing sibling attachment relationships, particularly when contrasted with studies examining primary attachment relationships.

Furthermore, the extant research predominantly concentrates on early childhood and early adolescence, with a notable scarcity of investigations encompassing late adolescence and adulthood. The studies reviewed underscore the imperative necessity for increased scholarly inquiries into sibling relationships, which constitute a pivotal and enduring component of the intricate web of familial relations, given the enduring presence of siblings within the familial milieu. There is a strong need to study and explore the sibling attachment to comprehend child development across diverse populations such as families at-risk, broken families, families having children with disabilities [5]. Research in the realm of sibling attachment suggests that female subjects tend to exhibit greater compatibility with their siblings, fostering optimal parental bonding. Individuals with elevated levels of sibling attachment also demonstrate secure bonds within their familial and peer relationships. Interestingly, the gender of siblings does not exert a significant influence on adult attachment styles. However, siblings of opposite genders report higher levels of fearful attachment styles [6].

Objective: The present study aims to explore and confirm the factor structure of sibling attachment inventory (SAI), adapted from the peer attachment sub-scale of inventory of parent and peer attachment (IPPA) originally developed by Armsden and Greenberg [7]. This study was carried out in the Indian scenario through the application of factor analysis and structural modeling techniques. Subsequently, the proposed tool will be utilized to examine and evaluate sibling-attachment relationships among cohort of senior secondary school students in India.

2. METHOD

2.1. Research design

The study utilized a descriptive survey research design, employing quantitative analysis techniques to thoroughly examine the topic under study. The study progressed through three distinct stages, each contributing crucially to the research endeavor. Stage-I involved data collection was meticulously conducted, targeting specific participants identified for the study. In Stage-II, rigorous data cleaning, coding, and integration into a user-friendly database, employing SPSS was carried out for streamlined data management and analysis. In Stage-III, the focus shifted to exploring the underlying factor structure of the collected data. Through exploratory factor analysis (EFA), redundant items were identified and removed, facilitating a clearer understanding of the data's underlying dimensions. Factor loadings of all items were calculated, and items were categorized within their respective factors. Finally, the factors were confirmed through confirmatory factor analysis (CFA), enhancing the validity and reliability of the study's findings. These sequential stages illustrated in Table 1 reflect a systematic approach towards ensuring the data robustness for maintaining the integrity of the study outcomes.

Table 1. Stages of the research study

Stage of research	Task completed
Stage-I	– Data collection from identified and selected participants.
Stage-II	– Data cleaning and coding and importing to the user-friendly database SPSS.
Stage-III	– Exploring the factor structure and removing redundant items using EFA. – Calculation of factor loadings of all items. – Categorization of the items within factors. – Confirmation of factors emerged using CFA.

2.2. Description of tool (SAI) used in the study

The SAI is adapted from the IPPA and modelled on the peer attachment scale [7]. It contains 25 items, scored on a five-point Likert scale. The IPPA scale was originally meant to analyze and categorize parent-child attachment, peer-child attachment relationships into secure, insecure, avoidant, and ambivalent types of attachment relationships.

2.3. Sample design

The study cohort encompassed a sample comprising senior secondary school students (N=250), with representation from both genders, enrolled in class XI, selected using stratified random sampling technique. The participants were systematically drawn from the pool of students enrolled in government-run and private schools, studying three streams of study namely: Humanities, Science and Commerce. The geographical scope of the study spanned across 10 districts within Delhi, thereby ensuring a broad and inclusive representation of the region's educational milieu.

2.4. Statistical and psychometric examination

Factor analysis: Factor analysis serves as a pivotal tool in enhancing the robustness, utility, and overarching efficacy of a given research instrument. Employing both EFA and CFA methodologies, an

exhaustive examination was undertaken to elucidate and assess the factorial framework of the SAI within the specific milieu of the Indian context. The EFA, executed utilizing the sophisticated statistical software SPSS (version 23.0), entailed a meticulous principal component analysis (PCA) with varimax rotation, aimed at discerning the underlying factor structure. This preliminary analysis laid the groundwork for confirming the identified factors through CFA, meticulously carried out using AMOS (SPSS-AMOS version 23.0).

3. RESULTS

3.1. Results and findings of EFA of SAI in the Indian context

Table 2 illustrates the outcomes of two pivotal tests commonly utilized in EFA: the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. The KMO Measure, approaching a value of 1, indicates the high suitability of variables within the dataset for factor analysis. In this instance, the KMO value of 0.875 underscores the dataset's adequacy for such analysis. Bartlett's Test of Sphericity gauges the degree of interrelation among variables. A significant result implies that the correlation matrix differs significantly from an identity matrix, suggesting the potential appropriateness of factor analysis.

Table 2. KMO and Barlett's test

KMO measure of sampling adequacy		0.875
Bartlett's test of sphericity	Approx. Chi-Square	3,989.513
	df	253
	Sig.	0.000

As depicted in Table 2, Bartlett's Test yields an approximate chi-square value of 3,989.513 with 253 degrees of freedom (df) and a significance level (Sig.) of 0.000, signifying a notable departure from an identity matrix at a high confidence level. These results affirm the dataset's suitability for factor analysis, indicating interrelations among variables and justifying the use of factor analysis techniques to explore underlying factors within the dataset. Factor structure: In the Indian context, the factors identified for SAI include Factor-1 (trust) comprising 16 items, Factor-2 (communication) containing 4 items, and Factor-3 (availability) with 3 items. Two items were excluded from the original adapted scale. Table 3 presents the rotated factor loadings of the SAI categorizing items under three identified factors namely trust (Factor-1), communication (Factor-2), and alienation (Factor-3).

Table 3. Rotated factor loading of SAI in the Indian context

Factor	Item no.	Factor loadings
Factor-1 (trust)	25	0.845
	19	0.844
	12	0.818
	15	0.776
	1	0.769
	21	0.765
	13	0.754
	4	0.740
	24	0.730
	7	0.675
	16	0.661
	20	0.658
	23	0.599
	2	0.592
	18	0.559
	8	0.491
Factor-2 (communication)	10	0.846
	3	0.684
	22	0.553
	17	0.486
Factor-3 (alienation)	9	0.778
	6	0.640
	11	0.613

A factor can be understood as an unobservable or hidden variable also known as latent construct that influences more than one observed measure and accounts for the correlations among these observed measures. Factor loadings indicate the strength of association between each item and its respective factor. For Factor-1 (trust), items such as 25, 19, and 12 exhibit high factor loadings, implying a strong correlation with trust-related

perceptions. Factor-2 (communication) is characterized by items like 10 and 3, demonstrating significant associations with communication aspects. Factor-3 (alienation) comprises items such as 9 and 6, reflecting their alignment with feelings of alienation. These factor loadings provide insights into the underlying structure of sibling attachment relationships among adolescents, aiding in the interpretation of the scale's psychometric properties.

3.2. Confirmatory factor analysis of sibling attachment inventory

The adequacy of the model fit for SAI is substantiated by the evaluation of various fitness parameters. The comprehensive CFA model comprises three discernible factors. The associated fitness parameters, as tabulated in Table 4, reaffirm the robustness of the model. Specifically, the chi square/degree of freedom ratio (CMIN/DF) ratio, total lymphoid irradiation (TLI), RMR/SRMR, comparative fit index (CFI), and root mean square error of approximation (RMSEA) are scrutinized against established benchmarks for model fitness. Notably, the CFI attains a value of 0.929, indicating a commendable degree of fit. Similarly, the ratio CMIN/ df stands at 2.493, reflecting a satisfactory fit of the model. Furthermore, the RMSEA exhibits a value of 0.064, which falls within an acceptable range, further validating the model's appropriateness. The estimations obtained consistently align with or exceed the prescribed thresholds for satisfactory model fitness, thus underscoring the validity and reliability of the final CFA model for SAI.

Table 4. Details of CFA for SAI

Estimand	CMIN/DF	TLI	RMR/SRMR	CFI	RMSEA
Benchmark	<3	>0.9	<0.05	>0.9	<0.08
Estimates	2.493	0.965	0.011	0.929	0.064

Figure 1 depicts the path diagram derived from CFA conducted using Amos software, illustrating the factor structure of the SAI standardized in the Indian context. The diagram is a visual map which highlights the existence of three distinct factors, viz. trust (Factor 1), communication (Factor 2) and alienation (Factor 3) each represented by a cluster of interconnected paths, elucidating the underlying organization of the inventory. The path diagram facilitates an understanding of the latent constructs measured by the instrument, providing a comprehensive overview of the Sibling Attachment Inventory's factor structure, enhancing the interpretability and utility of the assessment tool within educational and scholarly discourse. The Cronbach's alpha coefficient for the SAI was determined to be 0.952, denoting a high level of internal consistency. These results align with recent research findings, such as those by Noel *et al.* [2] which similarly identified the categorization of sibling attachment items into three distinct factors: communication, trust, and alienation.

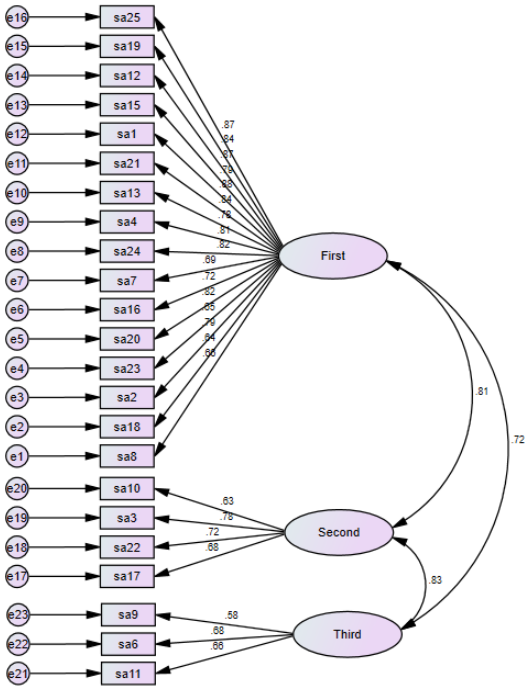

Figure 1. Path diagram of SAI indicating three identified factors

4. DISCUSSION

The attachment theory, put forward by Bowlby [8] has afforded a comprehensive exploration into the mechanisms through which individuals form affective connections as a mechanism for adapting to their environmental milieu, thereby developing their internal working memory (IWM). Furthermore, attachment theory serves as an illuminating lens for scrutinizing the roles played by parents (both mothers and fathers) during formative years, followed by siblings, and subsequently, peers and romantic partners, in shaping these interpersonal bonds [3]. These attachment relationships are recognized for their direct impact on the psycho-social adjustment, self-esteem, mental health, and social development of adolescents and young adults.

An emerging area of scholarly inquiry pertains to the examination of sibling attachments among young adults, a facet of human relationships that, as suggested by multiple authors, stands out as one of the lengthiest and profoundly impactful connections evolving over a lifetime. Concurrently, studies have focused on specific facets of parenting, such as care and control, as well as specific aspects of sibling relationships, encompassing behaviours, affect, and cognition [9]. A sibling, as one of the earliest figures of attachment, significantly shapes early psychosocial development, typically enduring throughout an individual's lifespan [10] along with significant but predictable changes in life circumstances related to security and stability of mother-child attachment relationships [11], [12]. Adolescence is viewed as a period of immense emotional stress and strain compounded by transitions from childhood to adulthood accompanied by changes in the biological, social, emotional, and cognitive capacities within an individual and in the eternal environment [13]–[15].

The investigation of sibling attachment during adolescence is paramount, given its robust predictive capacity for later-life well-being compared to parental attachment, as delineated by Shepherd *et al.* [11]. Additionally, sibling relationships exhibit an inverse correlation with the externalizing and internalizing problems of youths, while sibling conflicts directly correlate with feelings of loneliness among the youth [4]. It is essential to introduce suitable adolescent engagement and training programs aimed at improving social connections with friends, family, and society, making them more emotionally resilient and intelligent in order to support formation and maintenance of suitable adult relationships [16]–[20]. It is essential to note that formation of strong, reliable, and secure bonds among adolescents is essential towards ensuring psychological well-being, affective development and prevention of risky overt behaviours such as suicidal tendencies, and other anti-social activities such as drug addiction, alcoholism, bullying and delinquent behaviours [21]–[25]. Hence, development of coping and resilient behaviours among adolescents is essential to protect adolescents from engaging in self-harming activities [26]–[28].

In this context, SAI emerges as a valuable tool for the evaluation and exploration of attachment relationships, particularly within the sibling dynamic. The field of attachment theory has often marginalized the pivotal role of sibling relationships, with predominant emphasis on parents, peers, and romantic partners. Moreover, the implications of this study extend to diverse investigations, facilitating the valid and reliable assessment of the extent to which individuals regard their siblings as attachment figures and the perceptions that young adults harbor regarding their attachment bonds. The findings underscore the imperative for further research aimed at comprehensively exploring and understanding sibling attachment as a potent influencer of adolescent well-being.

5. CONCLUSION

The attachment theory provides a comprehensive theoretical framework elucidating the formation of long-lasting, deep emotional bonds in individuals to adapt to their environment, seeking affection, emotional security, and developing coping mechanisms for life's stressors. While extensive research has explored the roles of parents, peers, schools, teachers, and romantic partners in shaping these bonds, sibling attachment, often one of the earliest and enduring familial connections, has received comparatively less attention. The focus on sibling attachment is deemed critical for fostering and strengthening adolescent well-being, particularly given its predictive capacity for later-life psychological health, especially in scenarios involving familial disruptions or conflicts. This study aimed to adopt and validate the SAI within the Indian context, underscoring its significance as a robust instrument for standardized assessment. By employing the SAI, this study addresses a gap in attachment research by emphasizing the pivotal role of sibling relationships alongside other significant social bonds. The validation of the SAI within the Indian context affirms its psychometric robustness, supporting the assessment of secure attachment relationships, encompassing communication, trust, and alienation, among Indian adolescents in a culturally sensitive manner. Moreover, the implications of this research extend globally, supporting international endeavors in examining sibling attachment and its impact on adolescent psychological well-being. This study emphasizes the necessity for continued exploration of sibling attachment dynamics, employing innovative methodologies to comprehensively understand its influence on adolescent development. Through its clear presentation and alignment with international research, this study contributes to advancing knowledge within attachment

theory, with particular emphasis on sibling dynamics, thereby enriching the scholarly discourse in this field at both national and international level.

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