# Pro-environmental behavior in families: A reverse socialization perspective

SINGH, Pallavi, SAHADEV, Sunil, OATES, Caroline J. and ALEVIZOU, Panayiota

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ABSTRACT

The importance of adolescents' influence on family pro-environmental behavior is attracting significant research attention. Drawing from the socialization perspective, the impact of adolescents' environmental concern and environmental knowledge on parental pro-environmental attitudes and pro-environmental behaviour is investigated. The mediating impact of parental attitude towards an adolescent's influence and parental belief in the environmental knowledge of the adolescent is also explored. The study also looks at the moderating role of two different adolescent influence strategies. The conceptual model is validated using data collected from 352 parent-adolescent dyads in India. Results show that adolescents' environmental *objective knowledge* does not have any impact on parental pro-environmental attitudes and behaviour while environmental *concern* is a key factor. Overall, parents as learners do not simply play a passive role in the environmental reverse socialization process, challenging the traditional understanding of reverse socialization theory.

*Keywords:*

Pro-environmental behavior, reverse socialization, adolescent environmental concern, adolescent influence strategies

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## 1. Introduction

The child as consumer or influencer of family purchasing has been widely researched and discussed in the marketing literature (Kaur & Singh, 2006). Extant research suggests that the influence of children on purchase decisions increases with their age (Darley & Lim, 1986; John, 1999) hence adolescents have been acknowledged as having considerable influence on family purchase decisions (Atkin, 1978; Ekstrom, 1995; Chavda, Haley, & Dunn, 2005). However, whether they have an influence on the family adoption of pro-environmental practices is still under-explored in the literature (Larsson, Andersson, & Osbeck, 2010). The importance and relevance of young people in achieving sustainable development goals is widely articulated by the United Nations. The Global Action Programme for Education for Sustainable Development (ESD) by UNESCO recognised young people as central agents of change and included empowering and mobilizing youth as one of its five priority areas (UNESCO, 2018). As part of ESD, the importance attached to environmental issues in the educational system and the general exposure of adolescents to environmental conservation and sustainability related issues are expected to increase, leading to the empowerment of adolescents to act as influencers in promoting adoption of pro-environmental consumption patterns in their families.

Acknowledging the potential role of adolescents in acting as catalysts of attitudinal and behavioral change in families, several consumer psychologists as well as researchers in the field of education have studied adolescents' impact on their families (e.g., Ballantyne, Connell, & Fien, 2006; Ballantyne, Fien, & Packer, 2001a; 2001b; Ekstrom, 1995; Gentina & Muratore, 2012; Gronhoj, 2007; Gronhoj & Thogersen, 2007; Hopkins, 2005; Legault &

Pelletier, 2000). However, studies offer mixed results in the context of adolescents' influence on environmental socialization of parents. Some studies conclude that parents acquire environmental knowledge from their adolescents (Ballantyne et al., 2001a; 2001b; Evans, Gill, & Marchant, 1996; Volk & Cheak, 2003), but other studies show that adolescents influence their parents' environmental behaviour as well as knowledge (Damerell, Howe, & Milner-Gulland, 2013; Maddox, Doran, Williams, & Kus, 2011). Studies have also shown that while adolescents do participate in environmental consumption discussions in the family, they do not actually influence changes in family behavior (Gronhoj, 2006; 2007; Gronhoj & Thogersen, 2007). Further, these studies have had little to say about the process of adolescents' influence on parents' environmental knowledge and behaviour, on family negotiations, on factors influencing the level of influence, and on adolescents' actual effect on family environmental behaviour. The present study addresses some of these issues by using consumer socialization theory as a context to analyse the dynamics and factors involved in the socialization process.

Consumer socialization theory is widely applied to adolescents' learning of the consumption process and adolescents' influence on family consumption decisions (Chan & McNeal, 2006; Ekstrom, 2006; Watne & Brennan, 2009). However, the theory's application to environmental reverse socialization of parents remains under-explored. With a few exceptions (e.g., Ekstrom, 1995; Hall & Garma, 2000; Woollam, Griffiths, & Williams, 2006; Gentina & Muratore, 2012) studies that use socialization theory to explore the influence of adolescents' environmental reverse socialization of their parents are few in number.

The majority of studies exploring the role of adolescents in the environmental socialization of their parents is based in Western, developed societies (Evans et al., 1996; Leeming et al., 1997; Chavda, Haley, & Dunn, 2005; Stern, Powell, & Hill, 2014) and only a few studies consider this topic in developing countries (Damerell et al., 2013; Vaughan, Gack,

Solorazano, & Ray, 2003). This is a lacuna in the literature because the contribution of developing countries to global environmental degradation is becoming significant. For example, India was the third largest emitter of $CO_2$ in the world in 2017 (Pettinger, 2017). Though the Indian percapita $CO_2$ emission figures are much below the world average, with increasing pace of economic development $CO_2$ emissions percapita are growing at about 6% every decade (Dubash & Bharadwaj, 2018). It was estimated that 65% of India's carbon dioxide emissions in 2009 came from heating, domestic uses and the power sector, and that 9% came from transportation (EIA, 2014). These figures highlight how effective environmental conservation activites at the household level in India could play an important role in a worldwide environmental conservation effort. Hence, studies on Indian families and especially adolescents' influence on family pro-environmental behaviour as a means of reducing environmental degradation are very relevant.

India has taken major formal measures in the area of environmental education since the Stockholm summit in 1972. Environmental education is now mandatory in Indian schools after a Supreme Court ruling (Sonowal, 2009). However, in India there is very little research in this area. India is a country with the largest population of adolescents in the world, with 243 million individuals aged 10-19 years who constitute 20% of the world's 1.2 billion adolescents (Unicef, 2011). This combination of factors (India as a major contributor to environmental pollution and home of the largest adolescent population) makes India instrumental in the environmental discourse centring on young people as agents of change. The education policy of India expresses a strong conviction that through systematic environmental education it is possible to stimulate a sense of responsibility in young people which then can be transferred to the community (Green Teacher, 2012), an important fact that reinforces the relevance of India as a context for this research.

Culture plays an instrumental role in influencing family dynamics. Roland (1988) observed that Indian citizens have a familial self, which indicates a strong identity with important groups such as the family. This makes Indian society distinct from Western societies, which are more individualistic and focus more on individual achievements (Hofstede, 2001). Differences in culture influence the dynamics in a social group like the family. As Jain and Bhatt (2004) stated, giving respect to elders is an important trait of Indian culture, and the views of elders are always accepted and acted upon. Rao, McHale, and Pearson (2003) suggested that children in Indian middle class families grow up in a cultural context that emphasizes values of familial interdependence and filial piety that are different from the focus on autonomous self-development characteristics of Western families. This aspect of culture is important to researching reverse socialization, as it may affect the nature and success of the influence of adolescents in family decision making and in parents' receptivity towards that influence.

This paper will explore the role of adolescents in environmental reverse socialization of parents, the process of environmental reverse socialization, factors affecting the strength of adolescents' influence in the environmental reverse socialization of parents, and whether this socialization actually translates into pro-environmental behaviour in Indian families.

## 2. Literature review

### *2.1. Environmental reverse socialization*

According to Moschis (1987) socialization and re-socialization result from individuals' continuing adjustments to new situations. Socialization is in fact accepted as a lifelong process (Brim, 1966; Ekstrom, 2006; Moschis, 1987; 2007). An important element in this process is the socialization agent (Ward, 1974). Adolescents and children of a younger age

have been recognised as important agents of socialization for their parents (Gronhoj, 2006; Larsson et al., 2010). The process of socialization of parents by their children is termed reverse socialization (Foxman, Tansuhaj, & Ekstrom, 1989; Moschis, 1985). Based on Ward's (1974) insights, Gentina and Muratore (2012) described reverse socialization as a process of adolescents' influence on their parents' knowledge, skills, and attitudes related to consumption.

The family as a unit of consumption plays an important role in the environmental discourse and various family members work towards teaching different behaviors to each other. Adolescents are considered as vital actors, as they are (primarily) environmentally socialized in ways that their parents never were, due to the provision of environmental education programs in schools. Gentina and Muratore (2012, p.162) defined environmental reverse socialization as "the process where parents learn environmental knowledge, attitudes and skills from their adolescents", relevant to their functioning as actors in the sphere of environmental discourse. Based on Ward's (1974) suggestion that directly and indirectly relevant knowledge, skills and attitudes of consumption should be part of the research on the consumer socialization process, the present study focuses on directly relevant environmental knowledge, skills and attitudes. The study considers issues like knowledge about environmental problems and possible solutions to those; skills to behave in a pro-environmental manner (e.g., waste sorting, reusing, recycling, reducing water and energy usage); selection of environmentally friendly products, and pro-environmental attitudes.

Researchers in environmental education and consumer research have shown increasing interest in the effect an adolescent might have on their family's environmental learning and behavior. Studies in Australia, Poland, UK, Canada, Costa Rica, Hawaii and Madagascar found that adolescents learn about specific environmental behavior and attempt to influence their parents' knowledge and awareness about different environmental issues. For instance,

Ballantyne et al. (2001a; 2001b) showed that 9-18 year olds in Australia who attended environmental programs, subsequently initiated discussions at home. Adolescents in Poland shared their learning at home, with a third attempting to improve their family's waste practices (Grodzinska-Jurczak, Bartosiewicz, Twardowska, & Ballantyne, 2003). Results from UK, Canada, Costa Rica, Hawaii and Madagascar also concur with these findings and suggested that parents do learn environmental knowledge and attitudes from their adolescents (Evans et al., 1996; Istead & Shapiro, 2014; Maddox et al., 2011; Rakotomamonjy, Jones, Razafimanahaka, Ramamonjisoa, & Williams, 2015; Vaughan et al., 2003; Volk & Cheak, 2003; Woollam et al., 2006). However, the influence on actual environmental behavior such as family consumption practices is still not clear and remains an area that is under-explored.

### *2.2. Effect of adolescent knowledge and concern on environmental reverse socialization*

Environmental knowledge incorporates knowledge and awareness about environmental problems and possible solutions to those problems (Kollmuss & Agyeman, 2002; Bamberg & Moser, 2007; Isildar & Yildirim, 2008). 'Knowledge' is considered as an important factor in determining adolescents' influence on their parents. Research in consumer psychology posits product knowledge as one of the main factors which drives adolescents' influence on family decision making (Foxman et al., 1989). In the context of environmental reverse socialization, adolescents gain knowledge from formal environmental education and are exposed to media that provides them with the 'social power' which may encourage parents to view their adolescents' suggestions as credible and accurate (Uzzell, 1994). We hypothesise that:

> **H1**: Adolescents' objective environmental knowledge positively influences environmental reverse socialization of parents.

Environmental concern indicates "the degree to which people are aware of problems regarding the environment and support efforts to solve them and or indicate the willingness to

contribute personally to their solution" (Dunlap & Jones, 2002, p.485). Environmental concern has been treated as an evaluation of or an emotional attitude towards facts, one's own behaviour, or others' behaviour with consequences for the environment (Weigel, 1983; Sjoberg, 1989; Takala, 1991). It is suggested that environmental issues are more affective than cognitive, therefore an emotion like concern plays an important role in determining environmental behavior (Follows & Jobber, 2000; Nath, Kumar, Agrawal, Gautam, & Sharma, 2013). Kals et al. (1999) suggested that emotional affinity towards the environment motivates protective behaviour. Therefore, environmental concern driven by emotional affinity to the environment (Kals et al., 1999) and/or willingness to contribute to a solution (Dunlap & Jones, 2002) may motivate adolescents to environmentally reverse socialize their parents in a desire to protect the environment. Uzzell (1994), while exploring the process of adolescents' influence on parents' pro-environmental behaviour, found mixed results for the impact of adolescents' environmental concern on parental response. Uzzell (1994) found that in the UK parents were positive about their adolescent's catalytic role when they felt that their adolescent was environmentally concerned, but such relationships were not found among French, Danish and Portuguese parents. Uzzell's (1994) study used a qualitative design and hence the results were not generalizable. Therefore, to test the impact of environmental concern the second hypothesis will study the impact of adolescents' environmental concern on parents' environmental reverse socialization.

> **H2**: Adolescents' environmental concern positively influences environmental reverse socialization of parents.

*2.3. Parents' perception of adolescents' environmental knowledge*

Socialization literature suggests that influence is viewed as a process 'relative' to the influence of other family members (Belch, Belch, & Ceresino, 1985; Corfman & Lehmann,

1987). Explaining the influence in family decision making Davis (1976) suggested that an individual's resources relative to others and involvement in the decision impact the relative degree of influence. Davis (1976) conceptualised resources as both general, like education and occupation status of one member compared to another, or specific, like time availability during decision making. Expanding on this and taking the same concept of resources, Beatty and Talpade (1994) suggested that an individual's resources may be viewed as a source of his/her ability or power, whilst one's interest or investment in a decision provides the motivation. An adolescent's knowledge about a product or service and their involvement with it are considered to be the most important resource and motivation which guide their perceived influence in the family (Beatty & Talpade, 1994; Foxman et al., 1989), therefore providing them a social power attributed to their knowledge and expertise (Cialdini, 1993). Translating the discussion into the context of environmental reverse socialization, it seems likely that because of the formal environmental education adolescents receive in school, they can be perceived to possess more environmental knowledge than their parents and thus have some social power attributed to their knowledge in this category, leading towards the ability to influence their parents.

However, the strength of the social power of a socialization agent (adolescent in this study) over a learner (parent in this study) is not absolute and varies with the extent of the knowledge or perception of knowledge which the learner attributes to the agent within a given area (French & Raven, 1959). Cartwright (1959) stated that if adolescents are perceived as knowledgeable by their parents they also have a certain amount of social power over them in these categories. Whether the parent accepts the influence of their adolescent on family decisions depends on the perceived social power of the adolescent (Cialdini, 1993). Supporting the value of perceived social power by parents, Foxman et al. (1989) found that parental perceptions about an adolescent's resources (i.e. product knowledge) affected the

level of adolescent influence in family decision making, with adolescents whose parents had a high opinion of their resources having more influence on family purchase processes.

Therefore, in the context of environmental reverse socialization, it is hypothesised that a parent's perceptions about their adolescent's environmental knowledge will mediate the influence of the adolescent on the environmental reverse socialization of parents:

**H3a**: Parents' perception of their adolescent's environmental knowledge mediates the impact of the adolescent's environmental concern on environmental reverse socialization of parents.

**H3b**: Parents' perception of their adolescent's environmental knowledge mediates the impact of the adolescent's environmental knowledge on environmental reverse socialization of parents.

*2.4. Influence strategies*

John (1999) suggested that learning ways of becoming a successful influence agent through the use of influence strategies is an important aspect of socialization. Consumer behavior research shows that the particular influence strategy adolescents use determines the level of influence adolescents can exert on their parents (Cowan & Avants, 1988; Cowan, Drinkard, & MacGavin, 1984; Kim, Lee, & Hall, 1991). Adolescents use a variety of influence strategies to persuade their parents and change them according to product category and expected outcome (Atkin, 1978; Bao, Fern, & Sheng, 2007; Kim et al., 1991; Palan & Wilkes, 1997). Influence strategies are divided into two categories: unilateral and bilateral strategies (Bao et al., 2007; Offerman & Schrier, 1985). Unilateral strategies are one-sided, require no co-operation, but rather involve stating to one's partner (in the discussion) what one will do, whereas bilateral strategies are bidirectional, dynamic, interactive and require

partners to participate in a discussion and work towards mutual gain (Falbo & Peplau, 1980; Cowan & Avants, 1988).

Unilateral strategies include direct request, stubborn persuasion, and playing on emotions, whereas bilateral strategies include reasoning, bargaining, sweet talk, and coalition (Offerman & Schrier, 1985; Bao et al., 2007). The use of influence strategies differs depending on culture (Yang, Kim, Laroche, & Lee, 2014). Compared to Western cultures, adolescents in Eastern cultures use fewer bilateral and more unilateral strategies (Yang et al., 2014). The influence strategy research in India also supports Yang et al.'s (2014) findings. Chaudhary and Gupta (2012) found that unilateral strategies, mainly persuasion and emotional strategies, are more often used by Indian children and were found to be successful. But Yang et al. (2014) and Chaudhary and Gupta's (2012) research was conducted in the context of general purchase and they did not evaluate the impact of context of influence on the choice of strategy. As Kerrane, Hogg, and Bettany (2012) pointed out, adolescents learn to choose and manipulate strategies according to the demand and context in which they aim to influence.

Adolescents show sophistication in gauging expected levels of parental resistance (Gotze, Prange, & Uhrovska, 2009) and the likely parental response to their chosen strategy. Adolescents consider their parents' point of view (their beliefs) and have the skills to manipulate influence strategies incorporating those beliefs (Bartsch & London, 2000; Kerrane et al., 2012) and generally utilise bilateral strategies when they expect non-compliance from their parents (Bao et al., 2007). The choice of influence strategy in a social relationship also reflects the user's power status (Bao et al., 2007; Falbo & Peplau, 1980; Williams & Burns, 2000). In a family setting, the more adolescents become aware of the power imbalance (more power to the parents), the more they use bilateral influence strategies (Bao et al., 2007) as this may reflect greater anticipation of parental co-operation (Cowan et

al., 1984). The context of environmental reverse socialization involves learning about environmental attitudes by parents and changes in behavior and consumption decisions which may affect the family as a whole, thus time and effort are required which may incur relatively higher resources (time and/or finances). Resistance from parents could be expected and therefore adolescents' use of sophisticated bilateral strategies may reduce the resistance from parents and increase the impact of their influence, as parents appeared to be more responsive to purchase requests which were well thought through and which considered their own point of view (Kerrane et al., 2012). Whereas if the decision involves more resources and affects the family provisions, unilateral influence strategies which are more persuasive and coercive and do not involve any consultation with parents and no involvement of parents' point of view, may incur more resistance and conflict from parents. Therefore, the next hypotheses are expressed as:

**H4a**: Adolescents' use of bilateral influence strategies positively moderates their influence on environmental reverse socialization of parents.

**H4b**: Adolescents' use of unilateral influence strategies negatively moderates their influence on environmental reverse socialization of parents.

*2.5. Parents' environmental intention and behavior*

Outcomes of the environmental reverse socialization process of parents include the acquisition of environmental knowledge, skills and attitude (Evans et al., 1996; Istead & Shapiro, 2014; Maddox et al., 2011; Vaughan et al., 2003; Volk & Cheak, 2003; Woollam et al., 2006). Drawing on the Theory of Planned Behaviour, environmental behavior research suggests that attitude leads to positive intention to act and this intention strength is a proximal cause of environmental behavior (Ajzen, 1991; Ho, Liao, & Rosenthal, 2015). However, research offers mixed findings about the translation of this attitude to intention and then into pro-environmental behavior at a family level (Grønhøj, 2006; Grønhøj & Thogersen, 2007).

Many pro-environmental consumer practices involve more than one member of a household, and it may be difficult to motivate individuals to change their lifestyle; this may be an even greater challenge when several family members need to agree on changing established consumption habits and behaviors (Gronhoj, 2006). Further requirement of resources like time, money and available infrastructure to support the practices may also affect the likelihood of translating the attitude learned from the adolescent into behavior (Kollmuss & Agyeman, 2002). Therefore, to measure the outcome of the environmental reverse socialization process, the effect of parents' learning on pro-environmental intention and then translation to the pro-environmental behavior is conceptualised:

**H5**: Parents' environmental reverse socialization positively influences their intention to undertake pro-environmental behavior.

**H6**: Parents' intention to behave in a pro-environmental way positively relates to their actual environmental behavior.

The conceptual framework is presented in Fig. 1.

[Take in fig. 1 here]

## 3. Empirical study

### *3.1. Instrument design*

For the research two sets of questionnaires were designed, one for adolescents and one for their parents. The adolescents' questionnaire had two parts. The first part had questions on their environmental concern, objective environmental knowledge and influence strategies. The second part had demographic questions. The parents' questionnaire had three parts, the first had questions regarding parental perceptions about their adolescent's influence on their environmental socialization, and parents' intentions towards pro-environmental behavior. The second part had questions on parental perceptions of their adolescent's environmental

knowledge and parents' actual pro-environmental behavior. The last part had demographic questions. The questionnaires used established scales that have been widely applied and validated in previous studies and additional scales were adapted for the Indian context.

*3.1.1. Environmental concern of adolescents*

Environmental concern of adolescents was measured by a scale developed and tested by Alibeli and Johnson (2009) measuring the degree of environmental efficacy, signifying the adolescent's support and willingness to contribute to environmental solutions on a five-point scale of strongly agree to strongly disagree. Three items which loaded significantly were retained for the analysis.

*3.1.2. Environmental knowledge of adolescents*

To measure the objective environmental knowledge of adolescents 25 multiple choice questions were created, accommodating the kind of environmental education adolescents were receiving in school. One point was allocated per correct answer and zero for an incorrect one.

*3.1.3. Influence strategies used by adolescents*

Adolescents' influence strategies were measured on two dimensions of unilateral and bilateral influence strategies. The scale developed by Bao (2001) and tested by Bao et al. (2007) was used. This scale was successfully tested in India by Ali, Ravichandran, and Batra (2013). The unilateral and bilateral items measured on a five-point Likert scale were used as two different constructs in the analysis. Both unilateral and bilateral strategy constructs were measured by four items each. All the four items for unilateral strategies and two items for bilateral strategies loaded significantly and were retained to test further.

*3.1.4. Environmental reverse socialization of parents*

To measure how adolescents may environmentally reverse socialize their parents a construct ‘perceived environmental reverse socialization’ was coined. The construct measures parents’ perceptions about adolescents’ environmental influence on them. Since no adequate measurement was found in the literature with respect to environmental reverse socialization of parents, a measurement scale was developed based on a scale devised by Watne (2010) which was tested and validated in his later work (Watne & Brennan, 2011; Watne, Lobo, & Brennan, 2011). However, Watne’s (2010) scale measured reverse socialization of parents with respect to high technology products, therefore the scale items were modified as per the context of this research to measure environmental reverse socialization of parents. The scale measured on five-point Likert-type statements anchored in strongly disagree and strongly agree. The scales were pre-tested in a pilot study, and some items were changed or removed on the grounds of face validity (feedback from experts in sustainable consumer behavior, green marketing and marketing) and feedback from adolescent participants in the UK. Ten items loaded significantly and were retained in this study.

*3.1.5. Parents’ perceptions of adolescents’ environmental knowledge*

To measure parental perceptions of adolescents’ environmental knowledge a nine item scale was developed from the scale used by Foxman et al. (1989) in their research on adolescents’ influence on family purchase decisions. Foxman et al. measured adolescents’ product knowledge hence the scale was modified according to the requirement of this research to include environmental knowledge. Four items loaded significantly and were retained.

*3.1.6. Parental intention to undertake pro-environmental behavior*

To measure parental intention towards pro-environmental behavior a scale was created based on Steg (1999). The items were customised for the context of the Indian sample. The scale included items measuring inclination to behave positively in the context of energy saving, water saving, waste management, air pollution control, recycling, and related to purchase, focusing on everyday environmental behavior. Parents were asked to report their inclination to perform pro-environmental behavior on a five-point Likert scale of strongly agree to strongly disagree consisting of eleven items. Four items which measured energy, water, waste, and air pollution issues loaded significantly and were retained.

*3.1.7. Pro-environmental behavior*

For pro-environmental behavior, a scale based on Steg (1999) consistent with the Indian context was created. The scale asked the respondents about their level of pro-environmental behavior across several dimensions including: water saving, energy saving, waste management, air pollution control, recycling, and related to purchase. The scale included eleven items each with a five-point response anchored between very seldom to very often. Nine items measuring energy, water, waste, and air pollution issues loaded significantly and were retained for further analysis.

*3.2. Common method bias and order effect*

The variables were measured from adolescent-parent dyads. This eliminated the possibility of common method bias. Clear instructions were provided in the questionnaires and confidentiality was assured to improve the reliability of the answers. To counter the possible order effects between the intention for pro-environmental behaviour and the pro-environmental behavior scale, a gap between these two scales was created in the questionnaire. Three scales measuring different constructs were placed between the scales for these two constructs.

*3.3. Data and sample*

Twenty-two schools from four different states in India, which were active participants in an activity based environmental education program, "The Green School Program", were approached. Twelve schools from three states in India agreed to participate. Students of those schools in the age group of 13-18 years were asked to participate in the research. This age group was chosen because adolescents are considered to have gained full cognitive development (Smith, Cowie, & Blades, 2015), demonstrate more understanding of economic concepts than younger children (Strauss, 1952) and have developed information processing skills (Ward et al., 1977). The authorities of the participant schools informed the eligible student participants and their parents about the purpose of the research and their rights and asked for their voluntary participation. Written consent for their participation was obtained from the Principal of the school, the students and their parents. Full ethical approval was received from the first author's university.

To ensure that the questionnaire could be understood correctly by the respondents, a pre-test was conducted with school students from a large city in the UK who were of a similar age group as the target sample in India. Some of the general comments and suggestions were then included in the final version of the survey.

All the 12 participant schools in India were English medium schools and were agreeable to a questionnaire in English. A paper questionnaire survey was conducted in participant schools to reach the target samples of adolescents and their parents. The questionnaires were handed to students to be completed during school time. The parents' questionnaire was given to students to be completed by one of their parents at home. The completed questionnaire was then collected by the researcher. The questionnaires were collated as per adolescent and parent dyad. A total of 500 adolescent questionnaires and 430 parent questionnaires were received. Out of these 352 (704 individual responses) dyad responses were found to be valid

and included in the research. The sample included 54.5% female adolescent respondents. Among the parents, mostly mothers (51.7%) responded to the questionnaire. The average age of adolescent respondents was 15 years and for parents it was 43 years with an average annual household income of 500,000 Indian Rupees. Most of the parents were university educated with 56.8% having an undergraduate degree and 31.8% a postgraduate degree. Among the parents 32.7% of respondents were homemakers, 25% were self-employed, 23% were in private jobs and 19.3% were in government jobs. 61.4% of respondents belonged to nuclear families which constituted a married couple and their adolescent, 32.3% belonged to joint families which included both lineally extended and collaterally extended families (Niranjan, Sureender, & Rao, 1998), and 6.3% belonged to single parent families.

## 4. Analysis and results

Partial Least Squares Structural Equation Modelling (PLS-SEM) was used to test the hypotheses. PLS-SEM is a multivariate analysis approach used to estimate path models with latent variables and has been frequently used in marketing research (Hair, Sarstedt, Ringle, & Mena, 2012). One of the main advantages of using PLS-SEM is its ability to calculate consistent estimates even in the case of complex models (Hair, Ringle, & Sarstedt, 2011). Since the conceptual model is quite complex involving four levels of constructs, we consider PLS-SEM to be suitable in this context. PLS-SEM also enables inclusion of formative and reflective constructs in a single model. This was a critical feature that was found to be important in this study. Rigdon (2016) showed how PLS-SEM is a reliable statistical methodology especially when the sample size is not too small. We therefore consider the choice of PLS-SEM for this study to have been appropriate.

*4.1. Measurement model*

To assess the internal consistency reliability we considered the standardised loadings of the items, composite reliability (CR) and Cronbach's alpha as suggested by Hair, Hult, Ringle, and Sarstedt (2017). Most of the item loadings were above the threshold of 0.70 except for a few, which were marginally below 0.70. We retained these items however as the overall average variance extracted (AVE) and CR were well above acceptable levels.

AVE was used to assess the convergent validity. AVE values were above 0.50 for all the constructs, as shown in Table 1 suggesting a good convergent validity (Hair et al., 2017). Discriminant validity was assessed with a matrix of cross-loadings, where no violation was found. Additionally, a more conservative approach, Fornell–Larcker criterion was also used to assess discriminant validity, comparing the construct correlations with the square root of each construct's AVE (Fornell & Larcker, 1981). As seen from Table 1, each construct shared more variance with its own measurement items than with other constructs, therefore establishing discriminant validity of the measurement model. The heterotrait-monotrait ratio of correlations (HTMT) approach to assess discriminant validity was also used. All HTMT ratios were under the 0.85 limit for all eight constructs. All upper bootstrapping confidence intervals were below one, therefore providing evidence of discriminant validity. The items used in operationalising the constructs and their standardised loadings in the measurement model are shown in Appendix -A. The items used to measure Environmental Knowledge of adolescents are shown in Appendix-B

[Take in table 1 here]

*4.2. Structural model*

To test the basic model (without including any moderators) structural equation modelling (SEM) with Partial Least Squares was conducted using 5000 bootstrap re-samples. As can be

seen in Table 2, the $R^2$ values of main endogenous variables PERS_P and EB_P are moderate, indicating sufficient explanatory power (Hair et al., 2012), $Q^2$ value above 0.00 indicating predictive relevance (Chin, 1998) and SRMR value less than 0.08 explaining good model fit. All three criteria indicate that the structural model specification encompasses all the significant relationships among the variables (Hair et al., 2017).

[Take in table 2 here]

Table 3 provides the results of this analysis. The results show that objective environmental knowledge of adolescents (Eknow_C) does not show a significant influence on environmental reverse socialization of parents (PERS_P), therefore hypothesis 1 was not supported. Environmental concern of adolescents (Econ_C) had a positive and significant effect on perceived environmental reverse socialization of parents (PERS_P) supporting hypothesis 2. Perceived environmental reverse socialization of parents (PERS_P) showed a positive and significant effect on parents' inclination to behave in a pro-environmental manner (EBI_P), supporting hypothesis 5. Parents' inclination to behave in a pro-environmental manner positively and significantly affected their actual environmental behavior (EB_P), supporting hypothesis 6.

[Take in table 3 here]

*4.3. Mediation*

This study also assessed the mediating role of parents' perception of their adolescent's environmental knowledge (PPCE_Kn) in the relationship between environmental concern of adolescents (Econ_C), objective environmental knowledge of adolescents (Eknow_C) and environmental reverse socialization of parents (PERS_P) in the PLS path model. Thus, the indirect effects of Econ_C and Eknow_C on PERS_P through PPCE_Kn were examined.

Results of direct effect of Econ_C and Eknow_C on PERS_P and indirect effect through PPCE_Kn are presented in Tables 4a and 4b.

[Take in table 4a and table 4b here]

The results in Table 4a show that environmental concern of adolescents (Econ_C) had a positive and significant relationship with parents' perception of adolescents' environmental knowledge (PPCE_Kn). Whereas objective environmental knowledge of adolescents (Eknow_C) had no significant effect on parents' perception of adolescents' environmental knowledge (PPCE_Kn). Parents' perception of adolescents' environmental knowledge (PPCE_Kn) had a positive and significant effect on environmental reverse socialization of parents (PERS_P).

Table 4b shows the results of mediation effect of parents' perception of adolescents' environmental knowledge (PPCE_Kn). The direct and indirect effect of objective environmental knowledge of adolescents on environmental reverse socialization of parents (Eknow_C -> PERS_P) were both insignificant, therefore there was no mediation, so hypothesis 3b was rejected. Both the direct and indirect effect of environmental concern of adolescents on environmental reverse socialization of parents (ECon_C -> PERS_P) were significant, which signified that parents' perception of adolescents' environmental knowledge (PPCE_Kn) partially mediated the relationship. To further substantiate the type of partial mediation, the product of direct and indirect effect was computed (Hair et al., 2017). Since the direct and indirect effect are both positive, the sign of their product is also positive (i.e. 0.180*0.102 =0.01836) suggesting parents' perception of the environmental knowledge (PPCE_Kn) of their adolescent represented complementary mediation of the relationship from environmental concern of adolescents to environmental reverse socialization of parents (Eknow C -> PERS_P), therefore partially supporting hypothesis 3a.

*4.4. Moderating effect of influence strategies*

To assess the moderating effect of unilateral and bilateral influence strategies on adolescents' influence on environmental reverse socialization of parents a two-stage approach was used as suggested by Hair et al. (2017). The unilateral and bilateral influence strategies were measured by two reflective constructs which were introduced in the model after the basic model evaluation. Table 5 shows the results of the two-stage approach.

[Take in table 5 here]

Considering the results presented in Table 5, bilateral influence strategy marginally, but positively moderated the effect of adolescents' environmental concern (Econ_C) on environmental reverse socialization of parents (PERS_P), but there was no significant moderating effect on relation between objective environmental knowledge of adolescents (Eknow_C) and environmental reverse socialization of parents (PERS_P), partially supporting hypothesis 4a. The unilateral influence strategy had no significant moderating effect at all, therefore hypothesis 4b was rejected. It can be concluded that bilateral influence strategies impact the strength of the relationship between adolescents' environmental concern (Econ_C) and environmental reverse socialization of parents (PERS_P).

This is an important result because it shows that in India, bilateral influence strategies have a significant impact on the environmental reverse socialization process.

*4.5. The effect of control variables*

Since socialization happens in the social setting of a family, several sociodemographic variables were identified as control variables. Effects of age of adolescents, age of parents, family structure, education of parents, jobs of parents and annual household income were conceptualised as control variables. To check the effect of control variables a series of multi-group analyses was conducted using the procedure suggested by Hair et al. (2017). Each of the control variables was split into appropriate categories for conducting the multi-group

analysis. The multi-group analysis did not show any change in the sign or significance of the relationships tested in the main model, so it can be inferred that the control variables did not have any major impact.

To understand further the impact of demographics, four pairs of parent-adolescent dyads were constructed which included father-daughter, father-son, mother-daughter and mother-son pairs. Multi-group analysis was conducted following the procedure suggested by Hair et al. (2017). Before conducting the multi-group analysis, an invariance test was conducted to ensure the equivalence of constructs across the groups. No significant loading difference was observed, hence establishing measurement invariance of the model (Henseler et al., 2016). As a result of multi-group analysis on the parent-adolescent dyads, only two groups showed a significant difference in path coefficients. For father-son vs mother-daughter group, for PPCE_Kn -> PERS_P, the path coefficient difference was 0.313(p=.004) indicating that the effect of parents' perception of adolescents' environmental knowledge on parents' perceived environmental reverse socialization was stronger in the father-son group than the mother-daughter group. For mother-son vs mother-daughter group, it was seen that for PPCE_Kn -> PERS_P the path coefficient difference was 0.283(p=.017) indicating that the effect of parents' perception of adolescents' environmental knowledge on parents' perceived environmental reverse socialization was stronger in the mother-son group than the mother-daughter group. The parent-adolescent dyad groups did not show any other significant effect on other paths in the model.

*4.6. Post-hoc analysis*

To further understand the influence mechanism featured in the study, the serial mediation effect of adolescents' environmental concern (Econ_C) was tested. First, the serial mediation effect of adolescents' environmental concern (Econ_C) through parental perception of adolescents' environmental knowledge (PPCE_Kn) and perceived environmental reverse

socialization (PERS_P) on parents' inclination for pro-environmental behaviour (EBI_P) was tested. This serial mediation analysis was important to understand how the environmental concern of the adolescent actually impacted pro-environmental behavior of the family. Serial mediation was tested through the Preacher and Hayes (2008) method. The results of the analysis are shown in Tables 6a and 6b. The results showed that while the direct relationship from Econ_C to EBI_P was significant, the three indirect paths were also significant. Hence the relationship between Econ_C to EBI_P was partially mediated through both PERS_P as well as PPCE_Kn. Thus, the influence of an adolescent's environmental concern on their parents' inclination for pro-environmental behavior flows through (i) a parent's perception of the adolescent's environmental knowledge (PPCE_Kn), (ii) the perceived environmental reverse socialization (PERS_P) and (iii) a more indirect path that links an adolescent's environmental concern through a parent's perception of the adolescent's environmental knowledge which then influences the perceived environmental reverse socialization and then influences a parent's inclination to undertake pro-environmental behavior. This result is important because previous researchers (e.g., Chavda, Haley, & Dunn, 2005) have pointed out that there is a difference between the perceived influence of the adolescent and the actual influence of the adolescent on their parents' consumption behavior. The results of the present study show that adolescents have a real influence on the behaviour of their parents.

[Take in table 6a and table 6b here]

**5. Discussion**

The outcome of the analysis is summarised in Table 7. The present study confirms that Indian parents accept adolescents' environmental influence and learn about environmental issues from their adolescents. The learning affects parents' environmental knowledge, concern and also behavior which were measured through the perceived environmental

socialization (PERS_P) construct. This learning is translated into the intention to behave and into actual environmental behavior in families.

[Take in table 7 here]

The results showed that the environmental reverse socialization of parents is positively affected by the environmental concern of the adolescents but environmental knowledge of adolescents did not show any effect on the influence of adolescents on their parents. This suggests that contrary to popular consumer socialization results where adolescents' product knowledge is considered as an important resource on their level of influence (Foxman et al., 1989; Beatty & Talpade, 1994) objective environmental knowledge of adolescents as a resource does not ensure their suitability as an influencing agent in the environmental reverse socialization process. It is the emotional association with the environment and willingness to contribute personally to the solution (Dunlap & Jones, 2002) measured by environmental concern of adolescents which makes their parents more receptive towards adolescents' influence. This finding is in broad agreement with Raval and Martini (2011) who found that Indian parents show stronger affective reactions like sympathy and problem focused behaviour to their child's emotional appeals rather than to non-emotional appeals. This result offers an important contribution to the environmental reverse socialization literature by identifying that type of resource forms the base of adolescents' influence in the environmental reverse socialization process in India.

In terms of influence strategies, bilateral strategies showed a partial effect conforming to socialization literature that states that adolescents develop the capability to use more sophisticated strategies i.e. bilateral influence strategies, and become skilled in deciding which strategy will be most influential (Palan & Wilkes, 1997; Kerrane & Hogg, 2011; Kerrane et al., 2012). However, this result is opposite to the findings of Gentina and Singh (2015) who found that Indian adolescents are more prone to use unilateral strategies to

environmentally socialize their parents. This difference suggests that there is a need to explore the use of influence strategies with more varied methods and in other samples in future research.

French and Raven (1959), Brucks (1985), Cialdini (1993) and Beatty and Talpade (1994) explained that the strength of the social power of socialization agents (adolescents in this study) over learners (parents in this study) varies with the extent of the knowledge or perception which the learner attributes to the agent within a given area. Indian parents' perception of adolescents' environmental knowledge emerged as the most important factor influencing parents' receptivity to adolescents' environmental influence. The research shows that in the process of environmental reverse socialization parents do not simply act as passive receivers of information from their adolescents, they evaluate adolescents' resources as actors, on the basis of their own perception of their adolescents' environmental knowledge and then become environmentally socialized. As the results showed, for the relationship between environmental concern of adolescents and environmental reverse socialization of parents, parents' perception of their adolescents' environmental knowledge serves as a complementary mediator. Higher levels of environmental concern in adolescents increases environmental reverse socialization of parents directly, but also increases parents' perception of their adolescents' environmental knowledge, which in turn leads to their higher socialization from their adolescents. This partially supports the findings of French and Raven (1959), Brucks (1985), Cialdini (1993) and Beatty and Talpade (1994).

Previous researchers have proposed the role of social power of the socialization agent over a learner affects the strength of transmission of knowledge in the process (French & Raven, 1959; Brucks, 1985; Beatty & Talpade, 1994), but the present research showed that for the Indian families, parents' perception of their adolescents' environmental knowledge acts as an antecedent/mediator for the environmental reverse socialization process. This further

contributes to socialization theory by introducing the active role of learners and their subjective perception of an agent's resources as an antecedent in the environmental reverse socialization process.

Further, the results showed that the objective environmental knowledge of adolescents does not have any significant impact on parents' perception of their adolescents' environmental knowledge but the environmental concern of adolescents showed impact. This result could be explained by considering the nature of the environmental concern concept. Stern (1992) has termed environmental concern as a general attitude linked to the value orientation of self-altruism. Hence, environmental concern is related to emotions and often expressed as an emotion like anger or sympathy (Carmi, Arnon, & Orion, 2015). Research in Indian families has shown that emotional actions elicit strong behaviour from parents (Raval & Martini, 2011) and it is possible that environmental concern elicits greater attitudinal and behavioural reactions from the parents. This suggestion is supported by Carmi et al. (2015) who found that without an emotional element, environmental knowledge does not transform into behaviour.

### *5.1. Future research and limitations*

This study poses several research issues that could be explored in future research. The model could be replicated in other cultures. The scope of the model could be enhanced with other relevant variables including the influence of media; parental level of concern for the environment; ease of access to pro-environmental technologies, and peer pressure. Studies could also look at adolescents' environmental influence on families for different products, services and causes. Another opportunity for research is whether parents acquire only pro-environmental knowledge, skills and attitudes from adolescents or do they also acquire anti-pro-environmental skills and attitudes.

However, the study is not devoid of limitations. All the limitations of cross-sectional, survey-based research are present in this study too. Further, since the study was only conducted in those schools which agreed to participate and also as the questionnaire was distributed to the respondents with the explicit sanction of the school management, there is potential for some demand effects which involve the participant (both adolescent and parent) being aware of the topic of the study as well as being able to anticipate what the researcher is expecting to find (McCambridge, de Bruin, & Witton, 2012).

### *5.2. Practical implications*

This study also explored the mechanisms through which environmental concern of an adolescent impacts a parent's inclination to practice pro-environmental behavior. A serial mediation analysis showed that an adolescent's environmental concern has multiple routes of impacting parental inclination. The impact of concern can be traced through both a parent's perception of the adolescent's environmental knowledge, a perceived environmental reverse socialization as well as a route which comprises both the constructs. This evidence highlights the importance of an adolescent's environmental concern as a crucial variable in determining a family's environmental behavior and therefore strongly supports adolescent centric environmental education/awareness programs. This is an important message for both policy makers and environmental educators. The study also shows the relative insignificance of an adolescent's environmental knowledge in shaping a family's pro-environmental behavior. This points to the need for emphasising more on emotion-based messages that could improve concern rather than just providing information about the environment to adolescents. The study showed that parents are playing an active role as learners in the process of environmental reverse socialization, and they are the major decision makers in the family in terms of changing family consumption patterns and behaviors to be pro-environmental.

Therefore, adolescent centric environmental education alone will not create a major impact on changing a family's consumption pattern. Environmental education programmes should involve parents along with adolescents to achieve long lasting behavioural change.

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Fig.1 Conceptual model

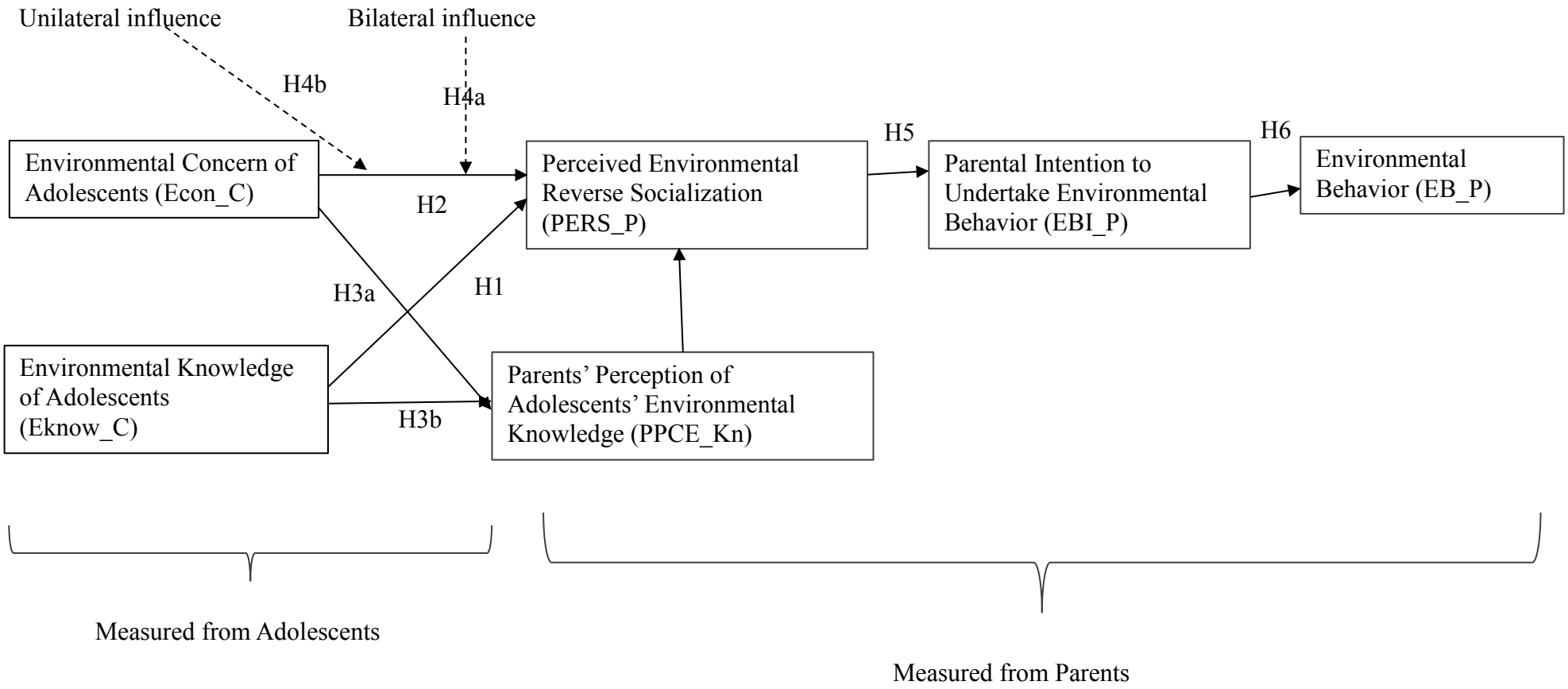

Table 1 Convergent, discriminant validity measures, means and standard deviations of the scale items

| | No. of items | PERS_P | EBI_P | EB_P | Econ_C | IS_Bi | IS_Uni | PPCE_Kn | CR | CA | AVE | Mean | SD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PERS_P** | **8** | **0.754** | | | | | | | 0.913 | 0.891 | 0.568 | 4.124 | 0.327 |
| **EBI_P** | 4 | 0.292 | **0.709** | | | | | | 0.801 | 0.770 | 0.503 | 3.556 | 0.390 |
| **EB_P** | 9 | 0.241 | 0.502 | **0.723** | | | | | 0.907 | 0.884 | 0.523 | 3.734 | 0.487 |
| **Econ_C** | 3 | 0.274 | 0.366 | 0.365 | **0.737** | | | | 0.778 | 0.790 | 0.543 | 4.1124 | 0.347 |
| **IS_Bi** | 2 | 0.169 | 0.074 | 0.118 | 0.202 | **0.740** | | | 0.707 | 0.674 | 0.546 | 3.1228 | 0.594 |
| **IS_Uni** | 4 | -0.163 | -0.254 | -0.315 | -0.390 | 0.049 | **0.749** | | 0.836 | 0.749 | 0.561 | 2.7302 | 0.569 |
| **PPCE_Kn** | 4 | 0.523 | 0.304 | 0.207 | 0.219 | 0.159 | -0.209 | **0.737** | 0.826 | 0.723 | 0.544 | 3.89 | 0.567 |

The diagonal elements are the square root of the AVE
PERS_P: Perceived Environmental Reverse Socialization (measured from Parent)
EBI_P: Pro-Environmental Behaviour Inclination (measured from Parent)
EB_P: Pro-Environmental Behaviour (measured from Parent)
Econ_C: Environmental Concern of Adolescent (measured from Adolescent)
IS_Bi: Bilateral Influence Strategy (measured from Adolescent)
IS_Uni: Unilateral Influence Strategy (measured from Adolescent)
PPCE_Kn: Parent Perception of Adolescent's Environmental Knowledge (measured from Parent)

Table 2 Model fit criteria

| | R Square | Q square | SRMR |
|---|---|---|---|
| **PERS_P** | 0.304 | 0.169 | |
| **EBI_P** | 0.096 | 0.044 | 0.063 |
| **EB_P** | 0.262 | 0.131 | |
| **PPCE_Kn** | 0.056 | 0.025 | |

Table 3 Path analysis results

| | Relationship | Path Coefficient | T Value | Sig. | 95% Confidence intervals | Support |
|---|---|---|---|---|---|---|
| **H1** | Eknow_C → PERS_P | 0.067 | 1.441 | 0.150 | [-0.024,0.159] | No |
| **H2** | Econ_C → PERS_P | 0.180 | 3.433 | 0.001 | [0.074,0.280] | Yes |
| **H5** | PERS_P → EBI_P | 0.310 | 6.064 | 0.000 | [0.209,0.412] | Yes |
| **H6** | EBI_P → EB_P | 0.471 | 9.986 | 0.000 | [0.378,0.563] | Yes |

Table 4a Mediation analysis testing stage 1

| Relationship | Path Coefficient | T-Value | P-Values | 95% Confidence intervals | Support |
|---|---|---|---|---|---|
| **Econ_C → PPCE_Kn** | 0.217 | 4.229 | 0.000 | [0.121, 0.328] | Yes |
| **Eknow_C → PPCE_Kn** | 0.084 | 1.413 | 0.158 | [-0.034, 0.197] | No |
| **PPCE_Kn → PERS_P** | 0.471 | 11.096 | 0.000 | [0.388, 0.555] | Yes |

Table 4b Mediation analysis testing, direct and indirect effect

| Hypothesis | Relationship | | Coefficient | T-Value | 95% Confidence intervals | Support |
|---|---|---|---|---|---|---|
| H3 | Econ_C → PERS_P | Direct Effect | 0.180 | 3.433 | [0.074,0.280] | Yes |
| | | Indirect Effect | 0.102 | 3.774 | [0.055,0.164] | |
| H3 | Eknow_C → PERS_P | Direct Effect | 0.067 | 1.441 | [-0.024,0.159] | No |

| | | | | |
|---|---|---|---|---|
| | Indirect Effect | 0.039 | 1.371 | [-0.016,0.097] |

Table 5 Moderation analysis

| **Hypothesis** | **Moderation relationship** | **Path coefficient** | **T Value** | **P Value** | **95% Confidence intervals** | **Support level** |
|---|---|---|---|---|---|---|
| **H4a** | IS_Bi * Econ_C → PERS_P | 0.218 | 1.927 | 0.054 | [-0.042,0.165] | Yes* |
| **H4a** | IS_Bi *Eknow_C → PERS_P | 0.023 | 0.447 | 0.665 | [-0.055,0.143] | No |
| **H4b** | IS_Uni *Econ_C → PERS_P | -0.036 | 0.224 | 0.827 | [-0,298,0.351] | No |
| **H4b** | IS_Uni *Eknow_C → PERS_P | -0.034 | 0.770 | 0.441 | [-0.084,0.101] | No |

*significant at $p < 0.1$ level

Table 6a Serial mediation: Direct effect of environmental concern of adolescent on inclination to undertake pro-environmental behavior of parents

| **Effect** | **SE** | **t** | **p** | **LLCI** | **ULCI** |
|---|---|---|---|---|---|
| **0.3917** | 0.0645 | 6.0759 | 0.0000 | 0.2649 | 0.5184 |

Table 6b Serial mediation: Indirect effects of environmental concern of adolescent on inclination to undertake pro-environmental behavior of parents

| **Effect/ model paths** | **Effect** | **Boot SE** | **BootLLCI** | **BootULCI** |
|---|---|---|---|---|
| **Total Effects** | 0.1212 | 0.0364 | 0.0565 | 0.1989 |
| **Econ_C → PPCE_Kn → EBI_P** | 0.0427 | 0.0183 | 0.0114 | 0.0828 |
| **Econ_C → PPCE_Kn → PERS_P → EBI_P** | 0.0146 | 0.0080 | 0.0017 | 0.0326 |
| **Econ_C → PERS_P → EBI_P** | 0.0292 | 0.0159 | 0.0030 | 0.0653 |

Table 7 Statistical support for the hypotheses

| Hypothesis | Description | Result |
|---|---|---|
| H1 | Objective environmental knowledge of the adolescent positively influences environmental reverse socialization of parents. | Not supported |
| H2 | Environmental concern of the adolescent positively influences environmental reverse socialization of parents. | Supported |
| H3a | Parents' perception of their adolescent's environmental knowledge mediates the impact of the adolescent's environmental concern on environmental reverse socialization of parents. | Supported |
| H3b | Parents' perception of their adolescent's environmental knowledge mediates the impact of the adolescent's environmental knowledge on environmental reverse socialization of parents. | Not supported |
| H4a | Adolescents' use of bilateral influence strategy positively moderates their influence on environmental reverse socialization of parents. | Partially supported |
| H4b | Adolescents' use of unilateral influence strategy negatively moderates their influence on environmental reverse socialization of parents. | Not supported |
| H5 | Parents' environmental reverse socialization positively influences their intention to undertake pro-environmental behavior. | Supported |
| H6 | Parents' intention to behave in a pro-environmental way positively relates to their actual environmental behavior. | Supported |

Appendix A. Scale items used in the research

| No | Construct | Items | Loading |
|---|---|---|---|
| **1** | Adolescent environmental concern | I want to participate in helping the environment. | 0.758 |
| | | I will prefer to live in harmony with nature to survive. | 0.621 |
| | | By destroying the nature we destroy ourselves. | 0.818 |
| **2** | Unilateral influence strategy | I pleaded or begged him/her to agree with me. | 0.710 |
| | | I told my father/mother what I wanted. I just stated my needs. | 0.726 |
| | | I made him/her feel guilty in hopes to have him/her agree with me. | 0.827 |
| | | I appealed to his/her love and affection to me. | 0.750 |
| **3** | Bilateral influence strategy | I tried to negotiate something agreeable to both of us. | 0.824 |
| | | I explained the reasons for my choice. | 0.726 |
| **4** | Parent's perception of their adolescent's environmental knowledge | I believe my adolescent knows a lot about environmental issues. | 0.760 |
| | | My adolescent has good environmental understanding. | 0.736 |
| | | My adolescent is getting good exposure to understand environmental issues. | 0.782 |
| | | My adolescent knows more than me about environmental issues. | 0.678 |
| **5** | Perceived environmental reverse socialization | I believe I have learnt a lot from my adolescent about environmental issues. | 0.684 |
| | | My adolescent teaches me about the impact of my behaviour on environment. | 0.749 |
| | | Because of my adolescent I have developed an understanding of the importance of environmental issues surrounding us. | 0.783 |
| | | Because of my adolescent I have become more concerned about the environment now. | 0.798 |
| | | Because of my adolescent I now feel more deeply for the environment. | 0.754 |
| | | My adolescent makes me rethink about my actions towards the environment. | 0.773 |
| | | Because of my adolescent I have become more conscious about environment protection. | 0.726 |
| | | My adolescent's views have changed my behaviour towards being more pro-environmental. | 0.756 |
| **6** | Parent's | I intend to recycle papers and glass to reduce the | 0.767 |

| | | | |
|---|---|---|---|
| | environmental inclination | waste going into landfills. | |
| | | I intend to save electricity as it saves the environment. | 0.782 |
| | | I intend to use public transport to reduce pollution. | 0.762 |
| | | I intend to reduce the waste of water as it is a scarce resource. | 0.670 |
| **7** | Parent's environmental behaviour | I try to save energy. | 0.758 |
| | | I use energy saving bulbs. | 0.828 |
| | | I switch off electrical appliances when not in use. | 0.829 |
| | | I sell empty bottles and used papers to kabadi wala. | 0.766 |
| | | When possible I use public transport or walk. | 0.728 |
| | | I walk rather than driving to a store that is close to my house. | 0.684 |
| | | I close the tap while brushing my teeth. | 0.652 |
| | | I use a bucket instead of a shower to take a bath. | 0.782 |
| | | I look for energy rating before buying electronics. | 0.787 |

Appendix B. Examples of items used to measure environmental knowledge of adolescents

| | | | | | |
|---|---|---|---|---|---|
| **1)** | Which ones among these can be categorised as bio-degradable waste | | | | |
| **a)** **Cans** | b) Paper | c) Vegetable peels | d) Plastic bottles | e) Garden trims | |
| **2)** | Which among these can be recycled | | | | |
| **a)** **Newspapers** | b) Glass bottles | c) Old cloths | d) Bio-medical waste | e) Broken glass | |
| **3)** | Which of these is the most energy efficient among all mentioned below | | | | |
| **a)** **CFL bulbs** | b) LED lights | c) Tube lights | d) Halogen bulbs | | |
| **4)** | What is the cause of global warming | | | | |
| **a)** **Greenhouse gases** | b) Ozone layer depletion | c) Rising temperature of sun | d) UV rays in the atmosphere | e) None of the above | |
| **5)** | Which among these vehicles emits the least carbon dioxide | | | | |
| **a) Petrol operated** | b) Diesel operated | c) CNG operated | d) Battery operated | e) None of the above | |
| **6)** | Which among these birds is nearly extinct because of toxic chemicals | | | | |
| **a)** **House sparrows** | b) Vultures | c) Crows | d) Pigeons | | |