

**CHILDREN AS CHANGE AGENTS IN ENHANCING ADHERENCE TO
HYPERTENSION MANAGEMENT IN ADULTS**

A thesis submitted during July, 2022 to the Centre for Health Psychology, School of Medical Sciences, University of Hyderabad in partial fulfillment of the requirements for the award of

DOCTOR OF PHILOSOPHY IN PSYCHOLOGY

by

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I, Sandra Roshni Monteiro, hereby declare that this thesis entitled “Children as change agents in enhancing adherence to hypertension management in adults” submitted by me under the guidance of Prof. Meena Hariharan is a bonafide research work which is also free from plagiarism. I also declare that it has not been submitted previously in part or in full to this University or any other University or institution for the award of any degree or diploma. I hereby agree that my thesis can be deposited in Shodhganga/INFLIBNET.

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CERTIFICATE

This is to certify that the thesis entitled “Children as change agents in enhancing adherence to hypertension management in adults” submitted by Sandra Roshni Monteiro bearing Reg. No. 16CPPH02 in partial fulfilment of the requirements for the award of Doctor of Philosophy in Psychology in the Centre for Health Psychology under School of Medical Sciences is a bonafide work carried out by her under my supervision and guidance.

This thesis is free from plagiarism and has not been submitted previously in part or in full to this or any other University or Institution for award of any degree or diploma.

Further, the student has the following publications before submission of thesis for adjudication and has produced evidence for the same in the form of the reprint in the relevant area of her research:

1. Hariharan M., Mutnury S. L., Padhy M. & **Monteiro S. R.** (2022). Child’s Understanding of the Mother: A Quantitative Index. *International Journal of Indian Psychology*, 10(2), 660-671.
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7. Padhy, M., **Monteiro, S.**, & Kavya, C. (2020). Coping Competence, Mindfulness, and Wellbeing of Indian Adolescents. *Psychological studies*. DOI: 10.1007/s12646-020-00584-6, 1-5.
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9. **Monteiro, S. R., & Hariharan, M. (2019).** Family Support in Effective Management of Hypertension: Role of Children as Passive Change Agents. *International Journal of Health Sciences and Research*, 9(6), 363-377.

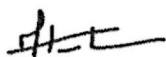
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3. International Conference organized by Department of Psychology, University of Madras (2018)
4. International Conference of Indian Academy of Applied Psychology at University of Rajasthan (2017)
5. National Seminar organized by Centre for Health Psychology, University of Hyderabad, in collaboration with Association of Health Psychologists (2017)
6. National Seminar organized by Centre for Health Psychology, University of Hyderabad, in collaboration with National Institute of Rural Development and Panchayati Raj and Association of Health Psychologists (2016)
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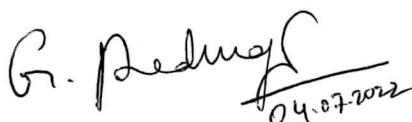
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3. HP 828	Review Paper (Paper III)	4	Pass
4. HP 829	Empirical Paper (Paper IV)	4	Pass



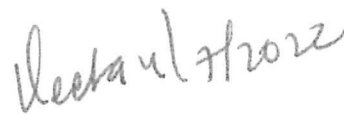
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Alone we can do so little; together we can do so much.

-Helen Keller

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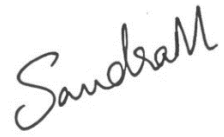
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A handwritten signature in black ink, reading "Sandra Roshni Monteiro". The signature is written in a cursive, flowing style, with the first name "Sandra" being more prominent and the last name "Monteiro" following in a similar script.

SANDRA ROSHNI MONTEIRO

ABSTRACT

Hypertension or high blood pressure (HBP) is a globally acknowledged warning cry for attention towards one's most important facets of survival, i.e., the functioning of the cardiovascular system. The estimated rates of prevalence and lack of hypertension control despite diagnosis is exponential in imminent cardiovascular mortality and functional disability. A strictly followed medically prescribed regimen along with lifestyle changes through diet and exercise is the key to optimal adherence and hypertension management. Owing to the overwhelming doctor-patient ratio especially in developing countries, hypertension treatment plans fail to create a surge in self-management. Previous studies have established that the right kind of social support and a strong cognitive foundation can solidify the conviction that culminates into adherence behaviour. This research study taps into both these spheres of influence and implements a hypertension knowledge intervention module and monitoring activity directed at children who are capable of being change agents in influencing hypertensive adults towards optimal hypertension adherence and HBP management. This delivery of a cognitive intervention supplies a logical foundation that is expected to latently dissipate to the hypertensive adult family members. This vision was conceptualised and implemented through a quasi-experimental interrupted time series design. Foremost, hypertensive adults were identified in the families of 181 school going children recruited through purposive sampling. Each hypertensive adult was assessed prior to the intervention module (meant for children) for their hypertension knowledge using the Hypertension Knowledge Test (HKT) and their hypertension compliance level using Hypertension Compliance Scale (HyCompS). Their blood pressure was recorded in accordance with medical norms using a digital sphygmomanometer. The systolic and diastolic numbers were converted into mean arterial pressure using standard formula. They were also assessed for personality Type A using Simplified Type A Questionnaire (STAQ), personality Type D using DS-14, and their perceived influence of child

over the adult was measured using Scale for Mutual Perception of Child's Influence on Adult (SMPCIA -for adults). In parallel, children were assessed for their hypertension knowledge levels using HKT. They were then inducted into the hypertension knowledge interventions that were conducted thrice (first immediately after pre-assessment of HKT, the second after a gap of 1 week from the first, the third a fortnight from the first exposure). The children were reassessed for their hypertension knowledge post intervention exposures. Alongside, children were also administered various scales to gauge psychosocial characteristics—Scale for Mutual Perception of Child's Influence on Adult (SMPCIA-for children) to assess their perceived influence over the adult; Achievement Motivation Inventory, Self-Efficacy Questionnaire for children, Big Five Questionnaire for Children, Short Grit Scale, Frustration Non Reward Responsiveness to measure achievement motivation, self-efficacy, personality types, perseverance, and frustration tolerance, respectively. Not only this, to behaviourally activate the agency of children they were equipped with a hypertension monitoring booklet that they were instructed to use to monitor the adult hypertensive adult family members in terms of their adherence to medicine, exercise, and diet through a simple response of Yes/No/ Don't Know, throughout the intervention period (42 days). Post intervention, the hypertensive adult participants were assessed once again for their hypertension knowledge levels, hypertension compliance, and blood pressure levels. Paired *t* test results showed that children had enhanced levels of hypertension knowledge overall and domain wise; while adults showed improved overall hypertension knowledge levels, specifically in the domain of general awareness. In line with the chief goal of the study, the hypertensive adults showed an improvement in overall compliance, specifically in the domains of medication compliance, and lifestyle and self-monitoring. ANCOVA analysis to examine the functionality of age showed differences between Classes 6 and 7 in terms of their own hypertension knowledge comprehension, and lifestyle and self-monitoring aspect of adult's hypertension knowledge; but no differential

impact for mean arterial pressure or hypertension compliance was found. Strong evidence of children's active agency in the adults' hypertension monitoring records was reported through a success rate of 77.58%, 71.97%, and 66% for the parameters of medicine, exercise, and diet respectively. Further the study evolved a path using structural equation modelling to trace the contribution of psychosocial factors in children and mutuality of perceived influence of children on adults, through their hypertension monitoring records, which in turn contributed to hypertension compliance and ultimately effected the mean arterial pressure. This fresh approach to hypertension care may be the much-needed sustainable solution to effective hypertension management. Implications, limitations, and future directions for this under-researched area are also discussed.

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LIST OF ABBREVIATIONS

ACE	Angiotensin-Converting Enzyme
AGFI	Adjusted goodness of fit indices
AMI	Achievement Motivation Inventory
AMOS	Analysis of Moment Structures
ANCOVA	Analysis of Covariance
ANM	Auxiliary Nurse Midwife
ARB	Angiotensin Receptor Blockers
ASHA	Accredited Social Health Activists
BFQ – C	Big Five Questionnaire for Children
BP	Blood pressure
CCB	Calcium Channel Blockers
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
DALYs	Disability-Adjusted Life-Years
DASH	Dietary Approaches to Stop Hypertension
DBP	Diastolic Blood Pressure
DS14	Personality Type D scale
EFA	Exploratory Factor Analysis
FCR	Framingham cardiovascular risk
FNRS	Frustration Non-Reward Responsiveness
GBD	Global Burden of Disease, Injuries, and Risk Factor
GFI	Goodness of fit indices
HBP	High Blood Pressure
HKT	Hypertension Knowledge Test
HWC	Health and Wellness Centres
HyCompS	Hypertension Compliance Scale
KMO	Kaiser-Meyer-Olkin
MAP	Mean Arterial Pressure
Mm / Hg	millimetre per level of mercury
NA	Negative Affectivity
NPHW	Non-Physician Health Workers
PCA	Principal Components Analysis

PCLOSE	<i>p</i> of Close Fit
PROLIFIC	Programme of Lifestyle Intervention in Families
RMSEA	Root Mean Square Error of Approximation
SBP	Systolic Blood Pressure
SEM	Structural Equation Modelling
SEQC	Self-Efficacy Questionnaire for Children
SGS	Short Grit Scale
SI	Social Inhibition
SMPCIA	Scale for Mutuality of Perceived Influence of Child on Adult
SPSS	Statistical Package for the Social Sciences
SRMR	Standardized Root Mean Squared Residual
STAQ	Simplified Type A Questionnaire
WHO	World Health Organisation

Chapter I

Introduction

Chapter I

INTRODUCTION

Background

Hypertension or high blood pressure (HBP) is a globally acknowledged warning cry for attention towards one's most important facets of survival, i.e., the functioning of the cardiovascular system. The major component of the cardiovascular system is the heart which energizes the circulatory system in a living being by transporting oxygen, nutrients and other essential gases to body cells through blood circulation (Hariharan, 2020). This circulation is facilitated through a force of the blood against the blood vessels across the body. Normally, the force of running blood within the circulatory system, referred to as the 'blood pressure'. A long-sustained norm of blood pressure recording is considered within the biological reference range of 120/80 mm/Hg. This reference point is indicative of the ideal amount of force exerted by the heart to pump the blood to various body parts. The upper number denoted as systolic pressure denotes the active state of the heart, and the lower number denoted as diastolic pressure denotes the pressure of the blood during the resting state of the heart. When this normative range shoots up above 140/90 mm/Hg—a state of hypertension or high blood pressure develops, and if it is consistently above limits, can signal the collapse of the cardiovascular process. However, the latest guidelines provided by the American Heart Association suggest a lower bookmark to diagnose HBP, i.e., 130/85 mm/Hg (Whelton et al., 2018) compared to the sustained norm by the European benchmark of 140/90 mm/Hg (Williams et al., 2018) to account for the possible complications at lower BP recordings and make space for earlier interventions. It is highly recommended that India adopts the lower criteria for diagnosis in order to counterfeit the alarming low level of BP control which was found to less than 15% (Anchala et al., 2014; Wander & Ram, 2018). There are no distinct symptoms that alarm this failure, justifying the colloquial usage of the term for HBP – 'the

silent killer'. A diagnosis of hypertension is determined by elevated blood pressure readings of three resting recordings in a span of two clinical visits (Aronow et al, 2011). A persistent high blood pressure is quantified through monthly monitoring of blood pressure for at least three times using a sphygmomanometer (Poulter et al., 2015) for a minimum of three months according to a criterion provided by the National Institute of Clinical Excellence. Blood pressure categories according to the new American Cardiology Association guidelines are as follow:

- Normal blood pressure: Less than 120/80 mm Hg;
- Elevated blood pressure: Systolic between 120-129 and diastolic less than 80;
- Stage 1 hypertension: Systolic between 130-139 or diastolic between 80-89;
- Stage 2 hypertension: Systolic at least 140 or diastolic at least 90 mm Hg;
- Hypertensive crisis: Systolic over 180 and/or diastolic over 120, with patients needing prompt changes in medication if there are no other indications of problems, or immediate hospitalization if there are signs of organ damage.

Hypertension can also be categorized as primary and secondary based on its causes. Primary hypertension is usually when the cause is idiopathic or unidentified (James et al, 2014; Mancia et al., 2009). Secondary HBP is secondary to ailments such as renal diseases, renal failure, pheochromocytoma, aldosteronism, or other mendelian forms (Carretero & Oparil, 2000). The condition of hypertension is associated with other physical ailments and hence can be reversed if the systemic cause or abnormality is treated.

Hypertension Prevalence

It would be natural to believe that this highly significant body mechanism is nurtured by individuals. However, statistics suggest otherwise. Hypertension, in fact, has the lead amongst chronic illnesses and is given the status of a global epidemic (Burnier & Egan, 2018).

Globally, it has been observed that hypertension has more prevalence in lower-middle-income countries (31.5%, 1.04 billion people) than in high income countries (28.5%, 349 billion people). More so, in India itself, it has been systematically reviewed that hypertension is prevalent in 25–30% of urban adults and 10–20% of rural adults (Anchala et al, 2014; Gupta, 2004; Gupta, 2016). Opportunistic screening of hypertension has brought forward reports of 5.5% prevalence in 55 lakhs of survey participants (NPCDCS, MoHFW, 2018). These numbers are clearly an underestimate and much lower than the government sponsored studies by Indian Council of Medical Research as well as other recent national studies (Geldsetzer et al, 2018; National Family Health Survey, 2018; Shah & Mathur, 2010). Despite the high prevalence and beyond the stage of diagnosis, in India, only 14% of hypertensive individuals above 50 years of age and 8% of hypertensive individuals younger than 50, have their blood pressure under control (Das et al., 2021). This is largely due to low awareness of hypertensive status and lack of medication adherence (Kontis et al, 2019; Lloyd-Sherlock, Beard, Minicuci, Ebrahim, Chatterji, 2014). With the shift in lifestyles, paediatric hypertension is also a growing public health concern. A systematic review and meta-analysis of 47 articles by Song et al (2019) reported that the pooled prevalence among children 19 years and younger was 4% for hypertension, 9.67% for pre-hypertension, 4% for Stage 1 hypertension, and 0.95% for stage 2 hypertension. It indicates an upward persistent upward rate of hypertension occurrence among children and adolescence. Findings have also proven the importance of prediction of high blood pressure (HBP) and other cardiovascular risk factors amongst children with hypertensive parents compared to children with normotensive parents (Kelishadi, Hashemipour, & Bashardoost, 2004).

Impact of Hypertension

Hypertension must be dealt with seriousness, not only because it has a strong predictive power in the occurrence of other cardiovascular disorders, but it also accounts for the high

prevalence of death and disability (Gupta & Xavier, 2018). It has been recognised as a principal risk factor for disease burden affecting 3.39 crore disability adjusted life years and 16 lakh deaths in India alone (Hay et al., 2017). It causes a national economic liability of 43 billion in Indian currency (Muruganathan, 2016). Results from the Global Burden of Disease, Injuries, and Risk Factor study 2015 (GBD, 2015) related risk factors to 41% of all disability-adjusted life-years (DALYs) in 2015. Hypertension has been recognised as a precursor to other health ailments such as stroke, heart failure, and other coronary diseases (Kaplan & Nunes, 2003). It in itself is a debilitating condition hindering daily optimal functioning consequently impacting ability to perform tasks associated with personal care and routine household needs leading to a loss of independence and decreased quality of life, especially with increase in age (Caskie, Sutton, & Margrett, 2010). Hypertensive patients also experience profound negative emotions risking them for development of mental health disorders particularly anxiety and depression (DeJean, Giacomini, Vanstone, & Brundisini, 2013). Such situational mental state has also been linked to non-adherence of medication (Jong, Moser, Chung, & Wu, 2008) further debilitating the vulnerability to hypertension risk.

Hypertension Management Approaches

Chronic illnesses are primarily understood from a biomedical perspective. Naturally, the management plans entail biomedical treatment. This reductionist point of view is being slowly replaced with a biopsychosocial integrated treatment plan that values the active vantage of the patient, their doctor and their social system, raising the appreciation of health through the mind-body interdependency (Astin, Shapiro, Eisenberg, & Forsys, 2003). Akin to this multidimensional approach to health, an effective hypertension management plan is also integrative in nature and demands sustainability over time.

The goal of hypertension management is to sustain blood pressure within the normal range of 120/80 mm/Hg (Nguyen, Dominguez, Nguyen, & Gullapalli, 2010). Even before the diagnosis of hypertension reaches a critical stage of medical intervention, i.e., in Stage 2 hypertension where pharmacotherapy is mandatory, hypertension can be managed through non pharmacological therapies and self-monitoring during the prehypertensive phases. The pharmacological therapy or drug therapy consists of diuretics, angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs), beta-blockers, and calcium channel blockers (CCBs) (Nguyen, Dominguez, Nguyen, & Gullapalli, 2010). Sometimes a combination of two or more hypertension targeted drugs are necessary to achieve normalcy in BP. Apart from pharmacologic treatment, maintaining and sustaining a healthy lifestyle is crucial to control BP and may even help in avoiding some of the associated risks or co-morbidities. Collectively, non-pharmacological interventions comprise of reduction in weight, minimal sodium intake, limiting alcohol intake, increase in physical activity, managing stress levels, and modifying diet in compliance with the Dietary Approaches to Stop Hypertension (DASH) eating plan endorsed by the Joint National Committee-7. DASH emphasizes on avoidance of food that has high salt, high carbohydrates, high fat or has preservatives, frozen food, alcohol consumption, or smoking. Instead, it recommends consumption of fruits and vegetables which would help to sustain high blood pressure. Long term adherence to these dietary requirements of the hypertensive patient would subsequently help them reduce the risk of cardiovascular failure. Another broad domain of hypertensive care is weight reduction and physical activity (Go et al, 2014) which can be achieved through regular exercise and an active lifestyle. An active lifestyle geared towards fitness may also combat the harmful effects of stress (Park, & Jang, 2019) and reduce health risk behaviours such as alcohol consumption and smoking (Lee, Yu, Choi, & Choi, 2022). Thus, the three major parameters of hypertension

care may be considered as medicine, diet, and exercise. Any hypertension care intervention should be built upon these parameters to ensure controlled blood pressure levels.

Hypertension Management: Facets of Adherence

Failure to initiate pharmacotherapy and lack of persistence in long-term lifestyle changes is a well confessed causality of poor control of blood pressure (Burnier, 2019). Following medical advice religiously is unfortunately resisted in most cases of hypertension. The act of complying with the processes to reach a goal and staying attuned to the behaviour despite temptations to give up is referred to as adherence. Adherence is defined by the World Health Organization (WHO, 2003) as “the extent to which a person’s behaviour—taking medication, following a diet, and executing lifestyle changes, corresponds with agreed recommendations from a health care provider”. When this adherence behaviour is demanded to manage the state of hypertension specifically, it is referred to as hypertension adherence. Broadly, adherence related sciences bifurcate three components essential to maintenance of a lifestyle change or medical compliance: initiation, implementation, and discontinuation. Further, causal factors of poor adherence have several taxonomies such as factors related to patients, social conditions, economic status, condition specific causalities, and healthcare facilities (Pan, Lei, Hu, & Li, 2017; van der Laan et al, 2017). Whilst most other domains leading to suboptimal adherence require macro level investigations and revolutions, focussing on patient-related factors would be a more pragmatic slant leading to better adherence and associated clinical outcomes. Patient-related factors have the scope of self-management and may be endorsed through strong positive reinforcement structures that encourage adherence to health promotion indulgence. These reinforcements would work best if it is supported by the patient themselves and the caregivers. Activating social support in patient related factors are already strongly linked to hypertension management (Osamor, 2015). In the WHO 2003 Report “Adherence to long-term therapies: Evidence for action” (Vrijens et al, 2012), useful indicators

of patient related barriers to adherence were accounted as denial of diagnosis, perception of illness severity or future impact, perception of treatment efficacy, fear of dependence, lack of knowledge, forgetfulness, limited follow up sessions with the doctor, and low self-efficacy. The derived understanding of these factors is that self-management requires the stimulation of social support and the right cognition/ awareness that could minimise threatful perceptions of the illness. Understanding the relevance of all these factors fortifies the approach of the biopsychosocial model of health (Engel, 1977) which emphasizes the interplay of the psychological state (knowledge, health beliefs, self-efficacy, mood states, stress, adherence behaviour, etc.), the sociological contributions (social support, functionality of caregiver, etc), in addition to the biological pathology. The major takeaway of these paradigms is that interventions aiming at effective hypertension management must be built to invoke two important pillars of adherence: cognition or perception of the disease and social support to withstand any resistance towards the treatment regimen.

Hypertension cognition in patients

A solid knowledge base is very important in the case of health promotion. It is otherwise known as health cognition. Cognition may be understood as the acquisition of knowledge, and the activity of its organization and implementation (Neisser, 2014). Particularly health cognition as dominantly used by health psychologists is defined as “the items of knowledge or beliefs related to health and illness”. Cognitive interventions are those that aim to focus on clarification, change of maladaptive beliefs and attitudes, and provide factual knowledge related to the disease state. Cognition departs from its synonymously familiar usage of knowledge, where knowledge is only factual concrete information, and cognition is the mechanism of information processing. When cognitive interventions are targeted, as in the case of hypertension, it aims to impart essential knowledge about the diagnosis, meaning, causes, causality, consequences, and management in simple non-technical language to be easily

comprehensible to the audience of the intervention, that eventually enhances their sense of self-control. It is reckoned that such effective communication of hypertension knowledge should be between physician or healthcare provider and the patient, paramount to the successful management of hypertension (Andrew, Hariharan, Monteiro, Padhy, & Chivukula, 2022). Contrarily, it has been observed by published studies that approximately 60% of hypertensive patients discontinue treatment and lifestyle changes within six months (Marcum et al. 2013), and the most common factors of non-adherence to the regimen were lack of understanding of the treatment plan, and lack of motivation and involvement in the treatment process. It has been documented that there is a gap in communication between the doctor and the patient in the context of improper explanation of disease state, causes, likely duration, and patients' expectations (Wilson et al, 2007; Wong & Lee, 2006) leading to poor adherence, poor patient satisfaction, and overall health status of the patient. This is mainly due to the overwhelming ratio of patients to the number of doctors and their lack of adequate time for each patient that fails to address important needs of the patients apart from diagnosis and medical advice. Elaborating knowledge and supporting the behavioural manifestation should be primarily done by the doctor. If not, the responsibility of knowledge culminating into a behavioural change should be facilitated by a knowledgeable health professional who would reinforce the agentic value and strength. Children in schools are already capable of comprehending and processing scientific information. This academic curiosity towards correct understanding of the disease state, consequences, causality and care, can seep into the collective consciousness of the family. With the right cognition, the agentic value of children can be used for the right knowledge transfer among hypertensive patients.

Social support: Role of family

The other important dynamic, i.e., social support, is well known as an important protective factor in hypertension management (Osamor, 2015) and can have positive

implications in health promotive behaviour. It has been defined by the American Psychological Association as “the provision of assistance or comfort to others, typically to help them cope with biological, psychological, and social stressors. Support may arise from any interpersonal relationship in an individual’s social network, involving family members, friends, neighbours, religious institutions, colleagues, caregivers or support groups.” Operationally defined, it is the targeted reassurance, adequate and readily available, direct or indirect, that communicates to the person that they are loved, cared and valued by others. Social support involves daily interaction and is propelled by communicative purposes (Leach & Braithwaite, 1996). The right social support can provide the appropriate reinforcement instrumental for the patient to initiate, practice and sustain any lifestyle change. Social support is received in the forms of informational support (advice, guidance, suggestions, or useful information), instrumental support (tangible assistance), emotional support (offering reassurance, empathy, comfort, and acceptance), and esteem support (feedback that help to promote one's skills, abilities, and intrinsic value), and belonging support (acceptance, attention, and support from members of the group). These kinds of social support are channelled either formally or informally. Formal social support networks such as professionals and public services are especially useful when one seeks informational support and tangible assistance (instrumental support). Informal social support such as the network of family members, friends, and neighbours come handy when one seeks emotional reassurance, feedback to enhance oneself, and to feel that one is accepted and attended to. Social support is extremely beneficial during stressful situations, but is not limited to crises only. It is manifested in everyday occurrence in personal relationships especially in a family structure (Barnes & Duck, 1994). A cross sectional study about the specific relationships between specific social support groups and hypertension found that living with a spouse and having more children was linked with lower blood pressure (Lei, Wu, Ye, Sunil, & Zhou, 2019). It reiterates the fact that family support is crucial to hypertension care. Family members

are capable of transmitting tranquillity, strength and courage to patients, which make them feel safe and supported in the disease experiences (dos Santos Costa, & Nogueira, 2008).

The agentic value of children

More often than not, children are underestimated in value of their family position and developmental phase. Children help shape the attitudes and behaviour of adults (Bell & Chapman, 1986; Russell & Russell, 1992). In line with the constructivist approach on human development, children are viewed as active agents who shape their approximate surrounding (Lerner & Busch-Rossnagel, 1981). “Children’s agency” is defined as the ability to use self-qualities to influence an adult towards a pre-defined goal. It helps to ascertain a directional influence of children on parents/adults, propagating child characteristics as causal agents for change in adult behaviour (Bugental, Caporeal, & Shennum, 1980; Brunk & Henggeler, 1984; Osofsky & O’Connell, 1972; Stevens-Long, 1973). Family members are not isolated outcomes of the socialization process, but rather interact in ongoing reciprocal processes. In the context of children’s agency, “reverse socialization” would characterize the intertwining of children’s influence upon their adult family members (usually parents). This offers rich research opportunities to partition variance between children’s causality on parents/adults. It is important to consider the dyads and their interpersonal mutuality of perceived influence. Further research designs need to incorporate mechanisms that facilitate this process. Similarly, age differences may have played a role. As children get older, they increasingly select and influence their environments, and it has been a more relevant stance in families with adolescents as compared to families with children (Russell & Russell, 1992). Children do not simply react to parental discretion but actively contribute to family dynamics and create new contexts uniquely. “Parental and child characteristics converge in the genesis” of behaviour (Lytton, 1990). Above all, this bi-directionality in transactive influences on each other need to be viewed as more than the sum of their parts (Maccoby & Martin, 1983).

In the case of hypertension management, children can be very powerful agents that can steer health behaviour change. This can be beneficial to themselves in the long run by warranting their own predisposition to the disease. It is critical to support them with the right knowledge base in order for this transformation to be correctly implemented. Many a times, unfounded or unsuitable advice from the close social network may adversely affect adherence and self-management behaviour (Ding, Li, Su, Yuan, & Lin, 2018). Any advice whether pharmacological or non-pharmacological that involves behaviour change requires to be correct and deeply understood to build a strong conviction for motivated health behavioural change. An adaptation to an anti-hypertensive lifestyle majorly requires self-management. This self-care oscillates with a push -pull motivation mechanism. An external push from a family member in addition to intrinsic motivation, may go a long way in strengthening adherence behaviour. Children have a leverage in nurturing a continuous reinforcement system that stabilizes this change. Especially during contemporary shifts of nuclear familial institution and loss of an over-arching support system in terms of a joint family network under the same roof, it augments the responsibilities of children in this direction.

Planning an intervention

There have been several forms of initiatives to control hypertension ranging from community-based interventions (Khuong et al, 2020), digital health interventions (Murray, May, & Mair, 2010), direct educational interventions directed toward patients and healthcare professionals, organizational interventions, and appointment reminder systems (Fahey, Schroder, & Ebrahim, 2005). All these interventions have variable effects on blood pressure control and are moderately efficacious in reaching the targets. The search for novel approaches to control hypertension is not to contest other interventions but rather assimilate as many interventions as possible owing to the steeply increasing crisis. Every method of intervening with the patient either is based on education or follow-up. A basic orientation that cannot be

filled by most techniques is the emotionally induced motivation in self-care. Often children in each family are underestimated in terms of their influential power to induce and sustain changes. This agency has been advocated by Monteiro and Hariharan (2019) especially in the area of hypertension management. Involving children in an intervention that plans and promotes health care garners two benefits. Firstly, it challenges the existing neutral or negative attitudes towards hypertension that has been resistant to other modes of adherence reinforcement. The entropy from isolated self-management or other forms of management is because of the lack of motivational orientation and involvement of an “at-risk” generation. Secondly, children can fill the gap of a systematic consistent action plan that is required to fulfil the daily demands of the chronic illness care. Children are already exposed to tons of information that they easily retain and implement in their daily life. If they would be correctly equipped with the right cognition and good instruction supported by logic, it is inevitable but to see a productive outcome of the dangerous illness like hypertension that can have severe consequences in their own lives.

While planning an intervention, it must be kept in mind that cognition is a tool upon which the infrastructure of hypertension management is built upon. Especially in the case of children, the first step should be to create a base and strengthen information related to blood pressure. Children in school are already exposed to the knowledge of various bodily systems and chronic illnesses. Adding and strengthening knowledge over a period of time would only be expanding and assimilating their schema related to hypertension. This form and mode of hypertension intervention, however, must come from a right source, i.e., a health psychologist who could not only mediate the information but also address any fears or distress with such grave information exposure. The information alone is half baked unless made meaningful and pragmatic to be implemented in reality. Chronic illnesses require daily management, and a form of daily activism that monitors the hypertensive patient. Coupling information

reinforcement with a daily diary record would not only enhance accountability but also initiate latent information dissipation. Any self-regulated activity helps to fulfil a psychological need and enhancing their health identity making them more likely to engage in that behaviour (e.g., exercising daily). Being self-aware and implementing monitoring in real life situations also increases one's self-efficacy (Saksvig et al., 2005).

Identifiers of goal achievement

Any goal achievement requires planning and prioritising of time, energy, and focus to gain the end result that one wants to accomplish. Any goal setting behaviour will be mediated by facilitators and be explicit in the case of certain personality characteristics. Fields of behavioural genetics have suggested that children with particular characteristics can also elicit certain reactions from adults (Reiss, 2003). In any interpersonal relationship, communication play a major role (Berger, & Roloff, 2019). The reactions in a dyadic relationship are determined by the nature of communication. Interpersonal interaction with a goal to reach is likely to get dissolved in such reaction and action. It requires some distinct personal characteristics to pursue the goal in the midst of such unpredictable reactions. In order to explore this, it is necessary to explore characteristics that contribute in the process of goal achievement. Especially in the case of tasks that involve interpersonal relationships, it is imperative to explore factors that withstand resistance to change. Firstly, personality characteristics or the dominant traits of every individual determine the relationship between our response, how we strategize, and how we choose to attain our goals. Five major domains of personality were proposed by Fiske (1994) and expanded upon by Norman (1967), Smith (1967), Goldberg (1981), and McCrae & Costa (1987). Even in case of children's emotional, behavioural and cognitive dispositions, these can be conceptualized as independent factors through this taxonomy. These five broad but not rigid classification of personality traits is:

i) Openness to experience — the willingness to learn new skills and use abstract thinking to solve problems. Only children with some inquisitiveness persist in goal pursuit.

ii) Conscientiousness — keenness to complete a task with dedication and attention to details. Not all children take the assigned task seriously particularly when it associated with academic evaluation. Conscientiousness is the quality that inspires children to commit to the task assigned.

iii) Extraversion — engages and enjoys others' company. When the task is interpersonal, it calls for the skill of people management. Only those with extraversion as a personality characteristic are highly likely to enjoy and accomplish the goal.

iv) Agreeableness—manifestation of socially approved behaviour and actions. Getting the adults to do a task or stop a task needs to be done with a behavioural tact, so that the appealing behaviour of the child impacts the adult to be amenable to change.

v) Emotional Stability— emotional resilience in situations of discomfort and distress. Failure in achieving the goal to make the adult adhere induces frustration. The children with emotional stability can withstand and persevere such situations.

Furthermore, any goal achievement requires a certain drive to propel. This drive is often stimulated by successes and accomplishments, and is referred to as achievement motivation (McClelland, 1961). Individuals high in achievement motivation would be inclined towards realistic goals, i.e., goals that are challenging yet achievable and where their abilities and skills could differentially affect the outcome. It is also required that one must have confidence in their capabilities to execute behaviour that help to reach the goal. This is known as self-efficacy, a belief that helps one influence control over events of one's life (Bandura, 1977). Any goal achievement is also bound to meet with obstacles or challenges. During such times, the ability to overcome the failure and continue with the goal is the much required 'push' in the form of perseverance or grit. Simply put, grit (Duckworth & Quinn, 2009) is the long term persistence and passion to achieve goals. At the same time, obstacles may block out

reinforcements or rewards that may cause frustration yielding non-reward frustration responsiveness / low frustration tolerance (Wright, Lam, & Brown, 2009). These factors have been linked to goal pursuits and similarly may be engaged in the pursuit of hypertension management monitoring activity or self-management of hypertension. At the same time, there may be certain personality traits of the subject individuals that exacerbate the progress such as having Type A or Type D personality type. Type A personality refers to “a complex pattern of behaviors and emotions that includes an excessive emphasis on competition, aggression, impatience, and hostility” (Friedman & Rosenman, 1959). Type D personality (Denollet, 1996) is defined as the joint tendency towards negative affectivity (e.g. worry, irritability, gloom) and social inhibition (e.g. reticence and a lack of self-assurance). These personality traits have been linked with essential hypertension and acute coronary syndrome patients (Steca et al., 2016) making them resistant type predictors in hypertension management.

Hypertension management does not simply entail passive engagement. It demands active involvement in the form of self-management. It is well known that self-management is a behavioural goal that requires a strong conviction to support it. It emphasizes the fact that it is not a goal achievable only by the doctor-patient dyad but rather is an objective of health behaviour. Health promotional activism is a purview of Health Psychologists who are adapted to support the biomedical system by invoking the psychological and social rudders of human functionality. It must be noted that despite the multitude of hypertension specific interventions and rulebooks in place, it is a disease that has very complacent opposition by the diseased. The high prevalence may cause high consensus, help to develop norms (unhealthy diet, lack of exercise, etc.), posing health risks that increase complacency over time indicative of high consistency in behaviour owing to unanimous poor health conditions in the social network automatically lowering distinctiveness. This causes inertia in proper health management because of the external attributions made by the individual (Kelley, 1967). It is not to be said

that the existing interventions have failed at but either fall short of emotional appeal, cognitive provocation, or simply is very exorbitant in terms of expense or energy. Hypertension care is in need of a petition of a cost-effective adaptive lifestyle change propelled by family members, the primary support for any patient. In any family, children are the resource points for updated reliable information as they are exposed to in schools, and are generally a malleable influence locus point in the family. This viewpoint must be productively used especially in a highly populated nation like India where there are 200 million school going children. By invoking this agency in children by equipping them with a sound and strong knowledge base, it is expected that it will revolutionize the holistic treatment that will trickle to the hypertensive family member who will be affectively motivated to sustain the necessary lifestyle changes. It is important that this be treated an important avenue to be tested through quasi-experimentation to explore the possibilities of a hypertension management intervention that educates the children and tracks the dissipation of knowledge converted into practice of an identified family member. Additionally, it is essential to mark out facilitators of this hypertension care change that would be impelled by children. This would help understand a pathway of rich unexplored potential in the field of health management—children’s agency, which has been judiciously used in other fields of study such as hygiene education, marketing, etc.

Research Problem Statement

We can make problem statements of the study in the following way:

- Can children be the agents of change required to optimise hypertension management in hypertensive adults of their own families?
- Is age a determinant in the children’s role as change agents in hypertension management of the adult family member?

- What are the psychosocial characteristics in the children that contribute to children's agency in effective management of hypertension in adult family members?
- Does knowledge intervention contribute to children's agency in bringing a positive change in adult family members' successful hypertension management?
- Does knowledge intervention to children and behavioural intervention by children help in enhancing adherence in adult hypertensives culminate in effective disease management following a path?

With this in mind, the development of a psychoeducational intervention must invoke behaviour changes that must address the affective state with an active social support network for the patient. Psychologists, with particular reference to health psychologists, are well equipped to activate the link that integrates psychology and health education while using the broad range of psychological knowledge about families, development, community organization, and intervention strategies.

Roadmap

The thesis is a scientific account of the viability of hypertension intervention exposures to children and its mechanism of cognition translation into behavioural monitoring indicated through hypertension control in an identified family member. Further facilitators of children's agency towards this goal achievement were also analysed. It is written as per the guidelines of the APA Publication Manual (6th ed.). The study embarked upon is detailed through five chapters including this. Chapter II comprises the review of recent literature, research questions, objectives, and hypotheses. Chapter III outlines the method of study. Chapter IV consists of results containing statistical analyses, tables, and figures. Chapter V comprises discussion, limitations and future directions, implications, and conclusion followed by two independent sections—References and Appendixes.

Chapter II

Review of Literature

Chapter II

Review of literature

This chapter entails a comprehensive understanding of the study's theme and related concepts explained descriptively and critiqued with the help of empirical findings put forward in a systematic manner. The objective of this is to create a strong scientific framework that helps to introduce the novel milieu of children's agency in hypertension care. Studies taken into consideration have not been time specific as this is a relatively unexplored and even less implemented extension of the biopsychosocial theory within healthcare. Evidence culturally relevant to India has been concentrated upon with special reference to the need for integration of the field of Health Psychology and health psychologists. The review of literature begins by building a base through an inclusive understanding of the nature of hypertension and its extended effect on other faculties, flowing into the need to control it, current strategies to curb it, and finally concludes with concrete enquiries that have established the need for the involvement of children in hypertension management and development of intervention plan around this idea.

Background: Nature of hypertension, its incidence and prevalence

Cardiovascular diseases, kidney diseases, and stroke are types of the most common non-communicable diseases having a global estimate of 17.8 million deaths in 2017, of which more than three quarters were in low-income and middle-income countries (Roth et al, 2018). The ironical speculation here is that these diseases are preventable and reversible in nature. Hypertension or high blood pressure has been a consistent risk factor underlying these fatal disease conditions (Lewington, Clarke, Qizilbash, Peto, & Collins, 2003), even though early screening and targeted therapy is an admissible solution for reduced threat. It shares approximately 55% of the accountability and 7% responsibility of all disability-adjusted life years (Lim et al, 2010). It is a disease that can be managed at a fairly low cost even in a poorly

resourced environment. Awareness and treatment in developed countries is available in more than 80% of the hypertensive population (Guessous, Bochud, Theler, Gaspoz, & Pechère-Bertschi, 2012; Guo, He, Zhang, & Walton, 2012; Wilkins et al, 2010) whereas the developing countries fail to screen and thereby, treat the condition effectively (Basu, & Millett, 2013; Ibrahim & Damasceno, 2012). India is burdened in terms of its health indices specifically related to hypertension (Jose & Prabhakaran, 2019). This rings an alarm against the background that the Global Burden of Disease recorded 1.63 million deaths in 2016 due to hypertension alone. The available data also shows that 54.2% of the deaths due to ischaemic heart disease, 56.2% of the deaths due to stroke and 54.5% of the deaths due to chronic kidney disease are attributable to high systolic BP (Compare & Hub, 2017). A systematic review and meta-analysis were undertaken by Anchala et al (2014). A comprehensive analysis of 142 studies between 1950 and 2013 on prevalence, awareness and control of hypertension in India reported that only 42% of urban Indians and 25% of rural Indians were aware of their hypertension status. Several health initiatives have been undertaken in India by national and state bodies to minimise the risk of the disease. They include ‘Universal Screening Programme for Hypertension’, ‘Diabetes Mellitus and Three Common Cancers’ in 2017, under the National Health Mission. ‘Annual hypertension screening’ is one of the programmes conducted by the auxiliary nurse midwife (ANM) and accredited social health activists (ASHA) who are responsible for organizing screening activities at the village or sub-centres which include health promotional activities to educate individuals, families and communities regarding healthy behaviours. They are regulated by guidelines to refer cases qualifying the hypertension benchmark to the medical officers of the nearest health centres so that rapid initiation of treatment takes place. Similarly, over 2017 and 2018 the ‘International Society of Hypertension’ in conjunction with the ‘World Hypertension League’, conducted a global hypertension campaign in India called the ‘May Measurement Month’ (2019) that aimed to

improve the screening of blood pressure which screened 190,955 individuals over 500 sites in India. The analysis of this data for India reported by Jose et al (2019) stated that 31.8 % of the screened population had hypertension and only 44 % of the individuals with hypertension were aware of their status prior to the screening, with over 80 % of the participants having uncontrolled blood pressure despite being prescribed antihypertensive medication. This report assumed great significance as this programme improved overall awareness regarding non-communicable diseases and risk factors through dissipation of information, education and communication activities, along with generating increased understanding and importance of screening through risk assessment provided by ASHA workers. However, the feasibility of carrying out such studies annually is questionable. The programme for the activities carried out by Health and Wellness Centres (HWC) in 2019 (2.3 crore screened for BP, cancers in 1 year under Modicare, 2019) consumed enormous amount of resources in terms of money, workforce, and infrastructure. Thus, it was a herculean burden on the resource-poor settings of India, and was already amiss of the target set for 2018-2019 where 10,000 unevenly distributed HWCs were operationalized against the target of 15,000. Another resource-intensive component of the programme is to provide proper training to ensure accurate screening by grass-root level workers. This task includes the arduous nature of active population census of all individuals above age 30 and their risk assessment by ASHA workers requiring a large workforce and efficient man-hours adding to their pre-existing duties. While the efforts of the government are laudable to create equity in health, there is a long road to cover in order to achieve controlled blood pressure among the population. This generates a need to support the existing health infrastructure by including a more avid health defence force that will also have an 'affective' advantage on the hypertensive patient. These reports build a needy case for a novel approach to sustain the health system. The present study proposes to access an unlocked potential for the continuous monitoring of the hypertensive patients through trained children

who through their agency govern the need of daily efficient and optimal self-management of chronic illness.

Need for hypertension control

The human body's circulatory system is vital life sustaining process as blood is transported from the heart to all body parts through blood vessels, supplying nutrition to every cell in the body. The blood vessels (arteries) push the blood against its wall as it is thrust out by the heart, which is known as blood pressure. High blood pressure may cause weak spots in the blood vessels which may eventually develop into bulges (aneurysms), cause congestion and may burst anytime. This burst can also cause blood leakage in the brain causing stroke. Other than these fatalities, chronic high blood pressure is a high-risk causal factor in renal failure, loss of vision, damage to the blood vessels and cognitive impairment. In the long term, the neglect could cost heavily in terms of invasive surgeries such as cardiac bypass surgery, carotid artery surgery and dialysis, draining individual and government budgets. This condition is not limited to its biological status but causes extend to its social drivers and behavioural characteristics. Social aspects of health such as economic and social deprivation due to discrimination in education, employment, and housing; racial inequality, social trauma, inadequate and degrading medical care (Williams, Priest, & Anderson, 2016), influence the onset of hypertension. Rapid unplanned urbanization also encourages the onset of hypertension as a result of unhealthy settings that cultivate the habits of fast food consumption, sedentary lifestyle, consumption of tobacco and alcohol. These factors can be denoted as 'stressors' (environmental factors) that may have an impact on stress levels which induces hypertension. The risk of hypertension also increases with age, genetic vulnerability, stiffening and ageing of blood vessels (Cuevas, Williams, & Albert, 2017). This can be slowed through healthy behaviours such as regular exercise, proper diet, restful sleep, etc. The inclusion of the behavioural risk factors and social determinants of hypertension highlights the biopsychosocial

evolution in the concept of health. Although this wholesome approach has occurred in academic and institutional contexts over the last few decades, a parallel change in the medical scenario is not present practically (Alonso, 2004). Another alarming fact about hypertension is its asymptomatic nature and difficult detection due to presence of very common symptoms such as headache, shortness of breath, dizziness, chest pain, palpitations of the heart and nose bleeds which get passed as ‘minor set backs’ not warranting a visit to the doctor followed by diagnosis and treatment. This results in the serious repercussions of uncontrolled hypertension, which could be fatal. Thus, it renders its colloquial name ‘silent killer’ attributed to its unreliable diagnosis from symptoms only. Higher the blood pressure, higher is the probability of harmful consequences to the heart, blood vessels, and major organs in the body—known as cardiovascular risk. High cardiovascular risk, in turn, is a dangerous index even for people with mild hypertension. When combined with other risk factors like sedentary lifestyle, smoking, obesity, co-morbid condition, unhealthy diet, high cholesterol, family history and various other psychosocial determinants hypertension poses high cardiovascular risk. The diagnosis of hypertension can be made using electronic, mercury, and aneroid versions of the blood pressure measuring device called the sphygmomanometer. WHO recommends the use of electronic devices over the manual or mercury versions, as mercury is a toxic substance and may prove to be more harmful than good in resource-constrained setting. Ideally, the average of the two consecutive measurements is taken with a minute apart with the person in a seated and rested condition. Recorded blood pressure can be classified as pre-hypertension, Stage 1 hypertension, and Stage 2 hypertension based on its intensity. The pre-hypertension phase denotes the threshold for the onset of hypertension where the risk of a heart disease is plausible. At this stage, lifestyle modifications in the form of exercise, managing normal range body weight, high fibre diet of fruits and vegetables, dairy products, and reduction of salt can reduce the prevailing danger. While social factors require long term strategies, preventive techniques

aimed at behavioural risk factors can eliminate the onset of hypertension, or even reduce the effects of mild hypertension. However, for the next two stages of hypertension a combination of the suitable pharmacotherapy and anti-hypertension lifestyle measures are recommended. Blood pressure medicines are targeted around the bodily malfunction arising from the condition, such as removing excess salt and fluid from the body, dilating the blood vessels, or through deceleration of the heart rate from its overworking state. As with other non-communicable diseases, self-care is an important component of prognosis, which can facilitate early detection of hypertension, adherence to medication and healthy behaviours, better control and awareness of the importance of seeking medical advice when necessary. Inducing self-care behaviour is particularly important for people in a limited resources environment.

Hypertension control strategies

The focus, till, recently, in most developing countries, was to contain communicable diseases. Priorities have now transited to the control and prevention of highly prevalent non-communicable diseases such as diabetes and hypertension, and its related morbidities. While the biological component of hypertension is taken care of by medical remedy, there are glaring polygonal lifestyle and morbidogenic environmental factors that evolve into contemporary chronic illnesses (Jaini & Lee, 2015) requiring psycho-behavioural intervention. Over the past years, simply medication was able to limit mortality due to hypertension complications, although the side effects of long-term medication couldn't be ignored as well (Gradman et al, 2010). There are 4 major types of hypertensive drugs which are effective only with sustained use. Diuretics help in elimination of salt and water and thereby decreasing blood volume, but can cause cramps, weakness or reduced libido. Calcium channel blockers help to dilate blood vessel walls, but their consistent use can cause irregular bowel movements or swollen legs. Beta blockers reduce the workload of the heart by slowing its rate and minimising the effect of a pressure-raising enzyme, but its long-term use can cause fatigue and impotence. ACE-

inhibitors prevent the conversion of angiotensin, a substance in the blood that constricts arteries, but it can cause coughing and palpitations (Herman, Padala, Annamaraju, & Bashir, 2021).

Pharmacological treatment was augmented as the only required treatment of hypertension, in line with the Western conservative approach towards health which is biomedical in nature. The want of a non-invasive approach in reducing mortality, and inspired by the biopsychosocial model of health and illness (Engel & Hansen, 1966; Schwartz & Shapiro, 1973), healthcare professionals searched for a wider angled view of the disease, i.e., the complex interaction of biological, psychological, and social factors that affect one's health state. The inclusion of non-pharmacological treatments was the advent of lifestyle management and social factors that affected hypertension. This is recommended in view of long-term effect. Though it ensures effective disease management, its characteristic demand on the patient 'to change' creates the major hurdle. The change that it demands involves dietary changes, and commitment to regular physical exercise and stress management strategies calling for behavioural or 'habit changes' in the patient. Such requirements are found to meet with the natural human 'resistance to change' and non-compliance and low compliance. Additionally, more emphasis on behavioural treatments may encourage only supplementary amounts of medication or no medication at all (Gradman, Basile, Carter, Bakris, & American Society of Hypertension Writing Group, 2010). Even today, the traditional approach to hypertension diagnosis and treatment largely consists of the traditional medical model where physicians identify the health problems, make the diagnosis, recommend and prescribe appropriate therapy and monitor only during follow up health visits (Logan, 2013). The case in point is not to eliminate the medical intervention but rather create a nourishing approach towards better health status, one with minimal side effects and maximum benefits. With this in mind, the medical system is trying to shift gradually in at least prescribing emphatic changes of lifestyle using

practical tasks along with safe drug dosages for strong efficacy in hypertension management, and available data suggests that at least 75% of patients are eligible for combination therapy to achieve BP target (Gradman et al, 2010). Non-pharmacological treatment options are otherwise called as ‘alternative medicine or alternative therapy’. Alternative therapies are more readily adopted than drug therapy as they have no side effects to them and therefore, serve as practical adjuvant to lower BP. Nevertheless, their implementation is not done unless the physician has prescribed them, and even then, there are individual differences in its response (Lin, O'Connor, Whitlock, & Beil, 2010). These set of therapies are more viable in prevention and treatment of pre-hypertension and stage 1 hypertension helping mitigate impending cardiovascular risk (Pimenta, & Oparil, 2010). It may also be recommended by a physician as a first aid measure for those who wish to delay drug therapy or may have severe side effects from it. It also proves very useful to ‘resistant hypertension’—one where combination or prolonged drugs use had effectively failed to pacify the hypertensive condition. A meta-synthesis of 359 full-text review and 110 abstracts done by Walsh et al (2006) synergised the effectiveness of mixed interventions for hypertension management where patients in the intervention groups experienced median reductions in SBP and DBP that were 4.5 mm Hg greater than observed for control patients. Promising results have been shown by various non-drug therapies, too (Brook et al, 2013; Wexler & Aukerman, 2006) that include “reducing dietary sodium to less than 2.4 g per day; increasing exercise to at least 30 minutes per day, four days per week; limiting alcohol consumption to two drinks or less per day for men and one drink or less per day for women; following the ‘Dietary Approaches to Stop Hypertension’ (DASH) eating plan (high in fruits, vegetables, potassium, calcium, and magnesium; low in fat and salt); and achieving a weight loss goal of 10 lb (4.5 kg) or more”. Studies have capitulated outcomes where several self-management strategies such as obesity management (Blumenthal et al, 2000; Semlitsch et al, 2016), reduced salt intake (Aburto et al, 2013), optimal nutritional consumption

(Aburto et al, 2013; Eckel et al, 2013). shrunk alcohol intake (Roerecke et al, 2017), moderate or vigorous physical exercise (Blumenthal et al, 2000) have proved to be efficient in lowering blood pressure. The contrasting fact is that the significant efficacy of these techniques does not translate into patients' adoption of them for BP control (Liu, Byrd, & Rodriguez, 2018).

It may be synthesized that the main pillars of good hypertension treatment would be a combination of medicine, exercise, and diet. The next rung would be the understanding of barriers and facilitators of good adherence to the factors that compose blood pressure. Nair et al (2011) had conducted an extensive study in 2008 on 8692 non adherent hypertensive patients using telephone survey to identify the barriers to adherence in medication for hypertension. The patient sample with a mean age of 63.4 years consisted of health plan members (both commercial members—63.8% and Medicare members—37.2%) with at least two prescription antihypertensive drugs. The results reported that 58.2% of Medicare participants and 60.4% of commercial group respondents missed a dose of medication. The foremost explanation quoted was “forgetfulness” in both groups, followed by “being too busy”. Other causes of non-adherence were due to travelling, being hospitalized or feeling sick, disturbance in daily activities, and inability to reach the pharmacy. Prescription copy was also a known barrier reported by less than 5% of the sample. An Indian study by Dennis et al (2010) also aimed to study non-adherence in the Indian context prioritising patients from poor socioeconomic status and low level of education. Randomly selected 608 hypertensive patients (mean age = 58.40 years) from the outpatient clinic of a hospital in Bangalore, India, were enrolled for the study among which 89.14% participants had not completed high school education. The results stated that about half of the patients were non-adherent to their medication, and further analysis confirmed that there was a significant ($p<0.001$) association between hypertension control status and adherence. Additionally, barriers to anti-hypertensive treatment were analysed, and it was found that participants had difficulty believing that medications are working (37.82%)

or that it will create a hindrance to them (5.92%)—this was termed as ‘belief barrier’. Another important modifiable barrier from the patient’s end was the identification of ‘recall barrier’, i.e., difficulty in remembering the schedule of medicine dosage was present in 62.17% of patients. Other patient-related barriers especially related to medication non-adherence were found to be cognitive dysfunction, low health literacy, co-morbidities, patient motivation, coping, and lack of social support (Ogedegbe, 2008).

In terms of dietary strategies, sustenance was found to be the most difficult aspect (Egan, Zhao, & Axon, 2010; Gao et al, 2009). Culturally fitting Indian studies found dietary compliance as food choice is a geographically relevant concept (Gopichandran et al, 2012; Rajasekharan et al, 2015; Shah, Kamdar, & Shah, 2009). Popular barriers of dietary compliance, i.e., low salt intake, changes in diet, weight loss, smoking cessation, alcohol reduction, were reported as low desire, interest, or awareness (Gee et al, 2012). As supporting evidence accounted through focus group discussions among hypertensive and diabetic persons (Gehlawat, Naik, Lakshminarayanan, & Kar, 2018), six themes emerged that explained their perspective of the occurrence of non-compliance—“initiation of dietary modification”, “awareness toward dietary modification,” “maintenance of dietary modification”, “compliance to dietary modification,” “family support in following dietary modification,” and “barriers faced in following dietary modification”. While most were aware and stressed upon the need for diet change, commonly encountered barriers were observed as lack of family support in diet plan as meals are cooked by another member to suit the preference of children’s taste, reluctance to cook for a single member separately was also documented. The participants positively appraised the change in diet as a healthier option although hurdles that made it difficult for them were lack of time, financial constraints, including the peer pressure presented as fear of being outcasted in social gatherings and the occurrence of conventional food choices. Similar to diet, sedentary lifestyle is an independent risk factor in the condition of hypertension,

and thus physical exercise is a very favourable intervention known to aid subjects with low responsiveness to other treatments and is included in the therapeutic approach to resistant hypertension (Dimeo et al, 2012). Continuous exercise is the most preferably prescribed activity by physician. A study by Guimarães et al, (2010) conducted on 65 randomized hypertensives who were exposed to continuous exercise training, interval training or a sedentary routine, conducted twice in 40-min sessions per week for a period of 16 weeks ascertained that although continuous and interval training resulted in control of blood pressure, interval training was superior as it also reduced arterial stiffness in hypertensives. The most common barrier to practice of physical exercise was self-reported as the management of co-existing physical conditions and time constraints (Gee et al, 2012). These findings overall justify the need for self-motivation for adherence to these daily requirements, as the different measures of anti-hypertension invariably demand daily attention and personal care. With better and novel strategies developed throughout the years, it is ironical that hypertension remains uncontrolled in the majority of the population—whilst the mortality rates have reduced slightly, morbidity places a heavy burden on the individual, society and the healthcare system (Weir, 2000). It is less than emphasised that the solution to the puzzle of hypertension lies in applying the already known techniques diligently.

Biopsychosocial treatment plan in action: personalized healthcare

Hypertension management has transformed with time and one of the major factors that outshines in the improvement of the condition is self-management. To support these self-management techniques, different agents in this chain of healthcare have been employed such as education of patients and health professionals, clinical decision support systems, practice audits and feedback, appointment reminder systems, the use of nurses or pharmacists as first-line caregivers, and self-monitoring of blood pressure (Walsh et al, 2006). The direct interaction of doctor and patient has been proven to be superior in improving prognosis among

hypertensive patients by directly influencing adherence (Swain, Hariharan, Rana, Chivukula, & Thomas, 2015). However, this mode of communication poses many a problem despite being the most efficient. Firstly, the doctor's extensive use of medical jargons (Thomas, Hariharan, Rana, Swain & Andrew 2014) creates a language barrier especially for patients with low literacy level as they have trouble comprehending health information, ask fewer questions, and thus, are unable to connect with the physician immobilizing compliance and propounding passive coping, consequently leading to lowered rates of hypertension control (Kim et al, 2011; Jolles, Clark, & Braam, 2012). McCray (2005) also testified this occurrence, i.e. patients with low levels of education are more probable to be treated in intensive care units rather than to engage in primary prevention. Secondly, the doctor patient relationship in India is dominantly characterized by a hierarchical relationship where the patient is a passive recipient as compared to the more egalitarian context prevalent in the West with a shifting dynamic where the patient now plays an active consumer (Akerkar & Bichile, 2004). In India, there is an extensive burden created by the low doctor-patient ratio where there is one government doctor for a population of 11,528 and one nurse for every 483 persons (Bagcchi, 2015), compared to the western ratio of doctor-patient 1:1000 (WHO, 2017). This factor disables the physician to spend any more than two to three minutes per patient (Das & Hammer, 2007) ultimately resulting in inadequate doctor-patient communication (Bhanu, 2010). A grounded theory approach study involving focus group discussions to understand health information seeking in Indian patients also found that one-third of the patients failed to obtain sufficient information from their physicians (Chandwani, & Kulkarni, 2016). Thirdly, there is observed a high 'power distance' between the patient and physician in India, characterized by paternalism and high degree of trust placed by patients on their physicians, yielding a one-way path of communication where doctor's decision is deemed best and unquestioned, and the treatment process remains unmodified to fit the patient's needs (Andrew, Kallavarapu, Thomas, & Swain, 2014; Deo, 2013; Fochsen,

Deshpande, & Thorson, 2006). These aspects push the need for information access elsewhere, sometimes to unreliable disintermediate forms of information. As an alternative approach, in Canada, the use of nurses or pharmacists as close monitors were authorized to intervene in order to regulate and alter anti-hypertensive medication and care which followed the doctor patient medical care model (Fahey, Schroeder, & Ebrahim, 2005). Despite being successful, it fell short in its tenacity as eventually it turned out to be costly and the patient did not actively participate in the treatment decisions.

Sustainability of treatment plans continues to be a challenge for different health interventions. Electronic health interventions have been designed to overcome these limitations. Though electronic reminder systems are more patient centric in nature, they often become a tedious affair as they sometimes require wired connections, internet access, and the complexity of navigating online platforms and computer screens, greatly reducing convenience for older patients (Halifax et al, 2007; Logan, 2013) or ones with low literacy level. Further, it is debatable whether electronic reminders actually play a role or is out-advantaged by the efficient case management. Health communication in various forms such as lectures, discussions, video sessions and outdoor activities to educate participants on weight reduction, importance of making positive lifestyle changes comprising of diet control, avoidance of smoking, exercise, and stress managements significantly improved knowledge and BP control rates among hypertensive patients in Sweden (Nilsson, Klasson, & Nyberg 2001). Such sustainable treatment plans require skilled involvement of health professionals who can use the understanding of affective, conative, and cognitive aspects to their benefit. It is highly recommended that health psychologists would be the seamless intervention point where group activities for patients (scheduled workshops) would enhance adherence through participatory learning and reliable information need satisfaction. Tailoring content of health messages can be a substitute to incorporate more written and visual forms of communication, and evidence

have been found to improve health literacy, adherence, and BP control among hypertensives (Jolles, Clark, & Braam, 2012) often having better outcomes than conventional approaches (Giuse, Koonce, Storrow, Kusnoor, & Ye, 2012; Kandula et al., 2009). The health information must be comprehensible and compatible with the learning styles of the patient (Giuse, Koonce, Storrow, Kusnoor, & Ye, 2012; Glasglow et al, 2013). Importance of the self is highlighted in the case of personalized communication because the patient is able to relate to and internalize the change.

Self-care and self-management: Context of familism

While the aforementioned strategies of personalized healthcare are many and partially beneficial, the ultimate onus of healthcare lies in the hand of the patient itself to seek and get beneficial health information and health-related support. At this juncture, the theory of self and responsibility of self through the management process has paved itself emphatically. Self-management is the answer to good health (Grady & Gough, 2015) which takes place through translation of positive attitude into practice. The disease management in hypertension involving major behavioural changes in diet, exercise and self-monitoring demands active participatory process from the patients' side. This calls for self-accountability and sustained motivation levels. It is imperative to understand that self-care or self-management cannot occur in isolation and requires the combined effort of self, and the contextual support of health care providers, community members, friends, and primarily family members (Rosland et al, 2008; Rosland, Heisler, Choi, Silveira, & Piette, 2012). This contextual support must be viewed in light of their agency towards self-management. Social support is a psychosocial dynamic that has been established to be health promoting, health restoring, and linked with decreased mortality risk (Gurung, Sarason, & Sarason, 1997; Sarason, & Sarason, 2001). This is reinforced by theories of Relationship Motivation (Deci & Ryan, 2014), Organismic Interaction (Moss, 2012) which sponsor that those motivated changes in health behaviour are our outcomes of

relatedness and autonomy in interpersonal relationships. Similarly, social cognitive theory (Bandura, 2001) focuses on the agentic perspective of physical and social aspects that support the behavioural change. When the aspects of self-management are scanned, poor health management by the individual's inertia can be blamed upon because of the external attributions predominant in coping mechanism. Three features of external attribution (Kelley, 1967)—high consensus (widespread and popularity of the disease), norm development (smoking with peer, unhealthy diet patterns, stress), and lowered distinction due to the commonality of the disease condition paired with heightened complacency over a course of time causes high consistency in health risk behaviour. Studies taking into account the agency of self and family members, have found fruitful results in this direction. Better self-management skills have been reported when peer support was included in self-management programs helping them gain better control over BP (Mosack et al. 2013) through enhancing their knowledge supplementary to building their self-management skills (Hayes et al. 2010). Group behavioural counselling sessions have also shown significant reductions in BP levels among senior citizens (Fernandez, Scales, Pineiro, Schoenthaler, & Ogedegbe, 2008). Additionally, home based counselling provided by nurses (Zhu, Xuejiao, Wong, & Wu, 2014) facilitated self-care management and knowledge among hypertensives (Clark, Smith, Taylor, & Campbell, 2010; Zullig, Melnyk, Goldstein, Shaw, & Bosworth, 2013). It is conjectural to say that the most closely knit in terms of proximity and emotional intimacy are the immediate family members who can have a direct influence and can hard press the behavioural changes through close monitoring of the patient. On the other hand, this involvement of family members technically termed as 'social support' may go in either directions, i.e., it may facilitate or impede the progress of motivational health behaviour change in the individual. Systems theory approach elucidates that change in the lifestyle of one member of the family will bring about a change in the lifestyle for the other members of the family (Ryan & Sawin, 2009). Now, only if the other family members

recognise the benefits of the positive health choices, will they be more supporting in the choices profitable to the patient. Implied here is also the value of emotions and bonds that can be translated into action without hindrance. India being an affiliation-oriented country provides advantageous opportunities in roping the emotional, social, and behavioural cues that are levied by the social network of the individual. Contrasting to this testimony of affiliation, few studies in cultural contexts other than India have elaborated on the impedance of familial support during illness. Individualistic nature accompanied with an internal locus of control in individuals of chronic illness may induce guilt and burden of having their family members provide psychosocial care, and at the same time, being badgered or criticised about the discipline required to manage the disease (Carter-Edwards, Skelly, Cagle, & Appel, 2004; Sandberg, Trief, Greenberg, Graff, & Weinstock, 2006). Family members may often not agree or even facilitate the same diet pattern prescribed and may even cause embarrassment about self-care (Gallant, Spitz, & Prohaska, 2007) establishing that adverse family relationships can spill over causing poor overall wellbeing throughout life (Repetti, Taylor, & Seeman, 2002).

‘Familism’ is a term, broadly defined as “a strong identification with and attachment to nuclear and extended family” (Bardis, 1959; Sabogal et al., 1987). It expands its connotation to the universality of human life indicative of high indices of cooperation, affiliation, and is extensively observed among kin (Neyer & Lang, 2003) leading to more nurturing, secure, and socially competent individuals (Donnellan, Larsen-Rife, & Conger, 2005). Familism typically consists of social norms, personal attitudes, and behaviour and is measured in the extent of endorsing its central components— “(a) a sense of obligation to family, (b) regarding family as the first source of emotional support, (c) valuing interconnectedness among family members, (d) taking family into account when making important decisions, (e) managing behaviour to maintain family honour, and (f) willingly subordinating individual preferences for the benefit of family” (Campos, Ullman, Aguilera, & Dunkel Schetter, 2014; Steidel & Contreras, 2003).

Contemporary evaluation of highly prevalent familism is observed in collectivistic cultures, like the Indian culture, Latino culture, or other Asian cultures associated with close proximity, shared households, household financial contribution through work choices, spending equitable time between peers and family, and mainly where family is prioritised over self (Abdou et al., 2010; Schwartz et al., 2010; Yeh & Bedford, 2003). According to a few theorists, putting family over self may indicate self-negligence. However, in a study conducted on a diverse group of University recruits in the United States by Schwartz et al (2010) in which the Attitudinal Familism scale by Steidel and Contreras (2003) was administered, it was derived that familism encompassed conceptually distinct subcomponents, and was associated with greater wellbeing and greater distress. Likewise, in another study of Latinos and non-Latinos (Europeans, East Asian Americans) by Corona, Campos, & Chen (2017), familism was negatively associated with loneliness, depression, and physical symptoms. Moreover, in its stress-buffering benefits, the combination of high familism and high stress correlated with higher self-esteem and subjective health, indicating that familism is advantageous in buffering stress, a well-known correlate of high blood pressure (Spruill, 2010). Familism alone does not ensure better outcome, rather its association with closeness and perceived social support which is directly linked to better psychological health and physical health (Campos, Ullman, Aguilera, & Dunkel Schetter, 2014). In other words, it simply implies that only strongly bonded families will have the upper-hand in better management of health crisis, as compared to families with digressed relationships. The high spot of this argument delineates those emotional cues and sentimental motivation plays a big role in driving behaviour, and this can be used to advantage health promoting behaviour obliging anti-hypertension care.

Close relationships and hypertension management: Transpiration of children

Family centred therapeutic measures towards hypertension ascertain good BP control by improving adherence in self-care. This confirmation paves a path for health professionals

to assess family support to improve compliance concerns in BP patients by developing innovative family-based models of hypertension care (Chacko, & Jeemon, 2020). Family-based treatment plans involve the whole family, promote inter-connectedness and work with pre-existing structural and environmental family conditions (Vedanthan et al, 2016). Similar family-based innovative models such as the PROLIFIC study (Programme of Lifestyle Intervention in Families) have vouched to control HBP by proposed lifestyle changes and self-care for cardiovascular risk reduction, thus making it more achievable and sustainable for the intended individual and their family members (Jeemon et al, 2017). Such comprehensive strategies achieve a two-point goal—tertiary treatment of high BP patient which activates the support of family and friends, and, primary prevention action plan for the other family members who are as much prone to the development of the disease. Moreover, it encourages India-focused studies, as acknowledgement and acceptability of lifestyle modification programmes is majorly unknown to the Indian mass. The PROLIFIC study experience was analysed in families in Kerala, India, serving an exemplary model for a comprehensive treatment action in cardiovascular improvement. This study aimed to evaluate the acceptability of the “reach and fidelity” of trial interventions of an integrated risk management plan and structured lifestyle modification (SLM) for high-risk cardiovascular management. The participants were gained through purposive sampling in a cross-sectional qualitative study who had completed one year of SLM. ASHA health workers who work in a broad area of health services, had acted as trained health interventionists labelled NPHWs (non-physician health workers) who visited the participant families once every two months to promote and monitor the SLM during the intervention phase. Retrospective experience was examined using 56 in-depth interviews and three focus group discussions. The findings suggested that family-centric trained healthcare worker led SLM interventions qualify desirability and feasibility in Kerala. The scope of improvement in such an intervention resulted in increasing the frequency of visits by NPHWs

for stringent compliance tracking, and importantly focussed at young children and adults to improve adherence. While the intervention had overall success and was met with enthusiasm and objectively lowered the cardiovascular risk status, the focal point of this study is the role that children played in the lifestyle adherence. It was meaningfully stated that it was difficult to involve children in dietary plans as their diet preferences differed. Another important observation relevant to the study was the identification of psychosocial components of self-management such as self-regulation, self-efficacy, role modelling, training among family members, and especially the involvement of children as passive recipients in the process which created hindrance rather than support for the choices, moreso in the case of dietary changes (Riggs et al, 2013). The necessary speculation here is that children and their choices should be more actively ingrained into the change process. If it were children who were given the responsibility to make the change, the chances of non-compliance would be greatly reduced (Vedanthan et al., 2016). The baton of active participation and the role of influencing must be equally shared among family members, and importantly should incorporate the children in any health decisions.

Contrary to popular opinion formulated by adults that children are presumed to ‘lack commitment, are self-absorbed, undisciplined, and are not interested in long term plans, along with being temperamental, inexperienced, and interested only in fun’, the fact remains that their value as dynamic members of the family have not been explored fully in the area of health. It has only been to our disadvantage that the potential of 200 million school going children, receiving full time education, and having access to reliable information from school and school initiatives, is not fully utilised in working upon the drawbacks of the current healthcare initiatives. Oswell (2013) in his sociological perspective of children’s agency has concisely stated that “the health of the nation and the wellbeing of the family are seen to be dependent on the happy and talkative child.” Through the connotation of ‘talking child’, Oswell implies

that the speaking child is a central component in the restructured modern family promoting emotional communication and security. There are several reasons for focussing on children to enable change principally in the area of hypertension (Monteiro & Hariharan, 2018). Firstly, positive health attitudes developed at an early age will be stable and enduring throughout the life span (Asunta, 2003). Working upon the risk factors of hypertension beginning in childhood and adolescence would reap benefits by inevitably delaying the progression or onset of clinical hypertension and related cardiovascular diseases (Raj, 2014) notably required as hypertension is a common finding in children as well. Blood pressure (BP) trails with age. Occurrence in childhood has been found to be significant predictors of future BP rank (Bao, Threefoot, Srinivasan, & Berenson, 1995), and by the time it is detected, it may have caused considerable damages to the arterial system, heart, and other organs as a result of long-standing high blood pressure (Berenson et al, 1994), the changes of which are already evident in childhood (Gupta-Malhotra et al, 2015; Feber, & Ahmed, 2010). Working with children on reducing hypertension management will thus help in securing positive health status for the subsequent generations as well. Secondly, the influence children have over their family members through their opinion, preference, and determination is highly valued by them (Alderson, 2003), supported by an imminent body of literature that appreciates the mutuality of relationships between children and parents (Ambert, 2001; Knafo & Galansky, 2008; Kuczynski, Harach, & Bernardini, 1999). The United Nations Convention on the Rights of Children has emphasized on the recognition of children's due right to be accepted, acknowledged, and encouraged to be actively involved in decisions that concern their lives (Skelton, 2007). The mutual power to exert influence is called the "circular causal process" which mainly entails the perception of the child's own influence on the parents; and the perception of parents about the influence of the child, although it will not be identical (French, Cartwright, & Raven, 1959). Kerrane, Hogg, & Bettany (2012) have suggested through their research that children are "skilled at the influence

strategy process, and were adaptive in their negotiations and behaviours, which were often recounted as iterative, processual narratives leading to eventual strategic success.” They have encouraged the use of such skills, as they also contribute to the development process of the self-management strategies which builds very strong ground for this study. A child as a part of the initiative to manage hypertension is not simply an alternative approach but a mandatory need as Indian studies have reported a presence of family history coinciding with high prevalence of elevated blood pressure in children (De et al, 2013; Patil, Patil, & Patil, 2014).

Contextual studies should be analysed to highlight the shift in behaviour or knowledge or both, due to the type of interaction between parent and child. Children have been known to have a positive effect on their parent, guardian, or significant adult by sharing knowledge on issues requiring dissipation of awareness (McDevitt & Chaffee, 2002; Saphir & Chaffee, 2002). Children as change agents have been recruited as early as in the 1980s. A study by Rohde and Sadjimin (1980) had engaged children to be effective transmitters in a diarrhoea prevention program, where they proved to be specific, reliable and convincing in their knowledge and brought change in attitude of their family members, simultaneously helping them develop new skills. This was deeply appreciated as semiliterate societies, such as rural areas, children could help in expanding primary health care activities to different targets (Rohde & Sadjimin, 1980). In another scenario, between 1986 and 1995, primary school children were involved in a dengue fever intervention program (Winch et al., 2002) where children participated in classroom and outside the classroom like viewing pictures, and playing games, that emphasized the breeding habits of mosquitoes and the fatalities of dengue fever to public health. Children were deemed as the primary change agents and helped communicating the information to their family and actively identified larval habitats and destroyed them collectively. This intervention proved that there was an increase in children’s knowledge on dengue and dengue prevention, and though the parents’ knowledge was not measured, there was a significant decrease in the

Breteau Index (a key indicator of dengue prevention), along with an increased proportion of water storage containers protected from mosquitoes, and decrease in other potential mosquito habitats. Yet again, in Zambia, children aged 11 and above participated in several activities such as discussions, drawings, role plays, and narratives centred on tuberculosis (TB), and then eventually discuss the symptoms of the disease at home. The result of this study brought to light the enthusiasm of the students to learn about the diseases, and discuss that with their parents. It also highlighted the reciprocal interest shown by the parents and encouraged to share the information in their community (Bond et al, 2010). Few other studies that have focused on such interactions have been observed to examine the success of children in fulfilment of their goals. A school programme developed to increase family preparedness for disaster proved to be an effective format that emphasised upon interaction and homework to be completed with parents and guardians (Ronan & Johnston, 2003).

In a more generalized perspective of health and hygiene, health education provided to students in Kenya, on various health conditions have authenticated that there has been improved knowledge and positively modified behaviour in both students and parents (Onyango-Ouma, Aagard-Hansen, & Jensen, 2005). The practice of handwashing as a part of hygiene intervention has seen success in various studies where pupils were able to catalyze changes in their home environment (Bresee, Caruso, Sales, Lupele, & Freeman, 2016; O'Reilly et al; Gibbs, Mann, & Mathers, 2002) and learnt about water usage, sanitation and health risks education, while they also passed this information onto their friends, parents and the wider community. In Tanzania, Africa, children demonstrated an active role as health change agents and even challenged traditional views of power, status, and wisdom associated with older age (Mwanga, Jensen, Magnussen, & Aagaard-Hansen, 2008). Similar effects of inter-generational transmissions of knowledge in the area of environmental education (Damerell, Howe, & Milner-Gulland, 2013; Hiramatsu, Kurisu, Nakamura, Teraki, & Hanaki, 2014; Olayiwole et

al., 2003; Vaughan, Gack, Soloranzo, & Ray, 2003), strengthening community approaches toward reducing the risks and stigma of HIV/AIDS (Kamo, Carlson, Brennan, Earls, 2008), malaria control, (Nonaka et al, 2008), community development for Palestinian refugee camps (Makhoul, Alameddine, & Afifi, 2011), trachoma health education and prevention (Dickman & Malek, 2013) have been evident in various studies. In India, too, studies enabling agency in children have been incorporated. In one, children were employed as peer health educators for ear health awareness saw significant achievement in establishing them as reliable dissipaters in improving health conditions (Sonavane, Deepthi, Rodrigues, & Chikkaraju, 2012). In another study by Mukhopadhyay and Bhatnagar (2005), school going children played the role of health promoters to educate their friends, peers and community members about diarrhoea and vaccine-preventable diseases, and accomplished their role significantly through reduced open defecation and improvement of personal hygiene behaviours.

Preventive programs to reduce cardiovascular risk had been undertaken for 10 years and were successful by involving both adults and children in a Prevention Education Program in Nuremberg, Germany (Schwandt, Bischoff-Ferrari, Staehelin, & Haas, 2009). Similarly, a randomized controlled trial by Fornari et al (2013) who randomized 6 to 10 years old children into two groups—experimental and control, to evaluate the effect of a multidisciplinary program in cardiovascular prevention to improve the Framingham cardiovascular risk (FCR) of their parents in one year's time. Both groups received written healthy lifestyle educational material for their parents. In addition, the experimental group were exposed to a weekly educational program about cardiovascular prevention with a multidisciplinary health team which included scheduled home visits, health education, and group sessions for a period of one year. The baseline data of 197 children and 323 parents revealed that 9.3% of the control group and 6.8% of the parents belonging to the experimental group had over 10%-year risk of cardiovascular heart disease predictive of the succeeding 10 years. The intervention of 1 year

saw a reduction of 91% in the intermediate/high Framingham risk group versus a 13 % reduction in the risk of the control group. Similarly, for average risk group, there was a decrease from 3.6% to 2.8% in the intervention group compared to the non-significant reduction in control group. This established a forefront that with the help of educational programme children could mitigate cardiovascular risk especially those who have intermediate and high-risk group.

Several risk factors of hypertension have been addressed in multiple interventions through children and have seen significant change in the lifestyle of the hypertensive members. Primarily these school-based interventions were effective in bringing about increased physical activity (Rhodes & Lim, 2018) reduced salt intake, ultimately lowering the blood pressure among adults in the family (He et al, 2015). In Sri Lanka (Yuasa et al, 2015) after a school-based intervention was provided to students, the adults reported a change in their attitude, awareness levels, and improved health quality by inducing changes in dietary patterns, hygiene maintenance, lifestyle habits, and physical exercise. Likewise, in a 12-month randomized cluster trial where school children of the 8th grade were motivated to bring lifestyle changes in their mothers and were provided concrete information about lifestyle risk factors saw weight reduction and increase in physical activity of their mothers (Gunawardena et al, 2016). In the same way, in Sousse, Tunisia, a school health education program saw significant effect of educative activities pertaining to usage of tobacco, increase in physical activity, and consumption of healthy diet, stimulating children to adopt health promoting activities such as walking to and from school and practicing sport (Harrabiet al., 2010). In Vietnam, where smoking is a very normalized behaviour, significant association has been observed between passive smoking and children's respiratory health (Hai, Ngoc, Lam, & Thich, 2006; Huong, Capra, Cook, & Anh, 2011). To mitigate this, children between 8 to 11 years were recruited for the trial intervention model called 'Children Say No to Second hand Smoke' (Huong,

Capra, Cook, & Anh, 2011). Here, children's role as change agents in changing their fathers' and other adults' smoking behaviour to locations outside the home was supported by the children themselves, and by their teachers and their parents. Similar studies in the United Kingdom (Alwan, Siddiqi, Thomson, Lane, & Cameron, 2011) and one in Pakistan (Siddiqi et al., 2010) for smoking cessation and consequently aimed at improving children's respiratory health by creating smoke-free home (SFH), invited the participation of children between 9 and 11 years of age where the children got familiarized with the concept of SFH, its hazard and its prevention with the help of classroom activities, such as quizzes, games, role plays, and poster presentations. They took home both pictorial and written educative materials emphasizing the harmful outcomes of SHS which helped their families recognise the benefits in supporting a smoke-free environment in their own homes. Both interventions saw success which was measured in terms of reduction in children's exposure to second hand smoke, and an increase in percentage of households with constrained smoking areas. This confirms the idea that when children enact upon their agency for change, it is well supported by the parents and other family members (Alwan, Siddiqi, Thomson, Lane, & Cameron, 2011; Olayiwole & Okoro, 2003; Onyango-Ouma, Aagaard-Hansen, & Jensen, 2005; Muzaki, 2011; Pridmore, 2003; Siddiqi et al., 2010; Winch et al., 2002; Xuan et al., 2013). In this role of 'health promoting actors' parents' support is an important encouragement in different interventions (Christensen, 2004).

Psychosocial aspects of children's agency

Researchers have identified that children actively share knowledge and health skills in daily life with their peers, siblings, and other adult family members, where children play a key role as communicators and health promoters within their families (Rydstrom, 2001; Primdore, 2003; Christensen, 2004). Adults tend to accept their children's demands (Trang, Ha, & Nhat, 2006) and are inclined to learn and share with their children in daily life situations (Thanh Xuan et al., 2013). There is also evidence that children engage in self-treatment in pluralistic medical

setups of their everyday illness episodes, thus attempting to be independent health agents (Geissler et al, 2000). There are many surrounding factors that affect their ability to contribute to their designated activities via schools, friends and peers, day care, health services, media, local community and consumers. School environments provide a very conducive setting that facilitates health education (Harrabi et al, 2010). This provision that comprises policy making and disease awareness is an emerging need stressed upon by Mendis (2016) in the editorial letter written for the Indian Heart Journal. However, they also tend to be inhibited by factors such as displaced prioritisation, scepticism shown by others about their self-efficacy, reallocation of responsibilities to adults or paid individuals, deficit of awareness, lack of interest, diminishing self-confidence, knowledge, and negative peer group influences (Iyengar & Jackman, 2004). In positive consideration, children require to incorporate the 5 Cs in their personality to enhance their agency—character, confidence, competence, and contribution. Children also learn to recognise their motivational advantages as increased self-belief, and the ability to express their opinions in any decision-making process which promotes their participation and comprehension of adult roles and responsibilities. They are also less predisposed to dogmatic and rigid religious propaganda, fatalistic beliefs and indoctrination (Pilgrim, 1999).

The family structure also plays an important role in this agency as children develop a unique and dominant position in families which have single parents, have co-habitation of parents, have waited long for marriage and have delayed childbirth collectively suggesting the diverse decision-making atmosphere, children's position involuntarily is raised to an active decision maker in the family (Flurry, 2007). It has been observed that children develop an autonomous and independent way of life during their growth years in families in which both parents are working (Dotson & Hyatt, 2005). Children from non-traditional families tend to have greater influence (Labrecque & Ricard, 2001). It has also been accounted that, mothers

play a closer, confiding and protective role in information dissemination to the fathers if they found it important (Le, 2014). This view was endorsed by mothers who unanimously agreed that their children would turn to their mothers more than anyone else when they had issues and problems (Mitchell, Tanner, & Haynes, 2009). Dissimilarly, Bresee, Caruso, Sales, Lupele, and Freeman (2016) found that children interacted more personally with the fathers in the implementation of the sanitation and hygiene facilitating construction, probably because it required mechanical participation as well. It is imperative to acknowledge the role of the vulnerable environment created from imperfect families that may change the quality and effectiveness of the communication.

Studies done to improve marketing strategies have identified several aspects of children's influence strategies which involve both—child's assertiveness and mother's child-centeredness that play a role in the mother's disposition to her child's requests (Berry & Pollay, 1968). Moreover, the style of requisition plays an important role in the success. A wide range of studies summarised by Kerrane, Hogg, & Bettany (2012) primarily aimed to study the family consumption pattern were targeted at children to be the influencing medium. These studies provide very important insight into the influencing patterns of children and their implementation in everyday activities. Atkin's (1978) study of 516 family units which had children aged between 2 and 12 were observed in the natural supermarket setting where the children demand their choice of cereals by expressing desires and through demand. Cowan, Drinkard, and MacGavin (1984) examined the individual essays of 198 adolescents (11–17 years) who admitted to their ways of influencing their parents, and condensed the strategies described to asking, begging, pleading, telling, and assertion, reasoning, demanding or arguing or stating the importance, bargaining, using positive and negative affect, persistence, verbal manipulation, eliciting reciprocity, use of an advocate (sibling), evasion, and the use of the Laissez-faire method. Similar trend of strategies was observed in the studies up till the year

2000, which followed different methodologies to document these tactics such as diary studies filled by mothers, individual questionnaires, in-depth interviews, literature reviews, questionnaires, and videotaped observations of family interactions (Isler, Popper, & Ward, 1987; Cowan, & Avants, 1988; Palan, & Wilkes, 1997; Williams, & Burns, 2000). These reports emphatically highlight the use of affective techniques that children already use to achieve their goals. Studies assimilated beyond the year 2000 (Thomson & Laing, 2003; Belch, Krentler, & Willis-Flurry, 2005) have recognized an additional strategy to strengthen their conviction through use of virtual knowledge probably supported with the boom of technology and internet. Iyengar and Jackman (2004) stand conflicted with this stance and have stated that there is an overrepresentation of children as media and internet users, as a large section is uneven in terms of technological knowledge. Nevertheless, the evidence elucidates the power of informational knowledge on the influencing power of children. Drawing analogy to the aim of this study, reliable and accurate knowledge presented in multimedia form can translate the swaying tactics of children. Children also help in bridging the language barrier due to low literacy levels prevalent in the older generations more so in rural areas and their agency assumes the role of a translator and mediator of the change, transforming it in a language easily comprehended by parents or grandparents (Mitchell, Tanner, & Haynes, 2009). Children have more exposure to the external socialization agents of unprecedented technology, internet, and reliable material available, and their evolved skill in using them which gives them an upper hand making them more knowledgeable than their parent (Francisco, 1999).

Digging deeper for better understanding of the influencing strategies, Johnson (1976) has explained the use of the strategies used by the influencer child which vary in nature, and are classified under many heads such as “*bargaining* (e.g. dealmaking, eliciting reciprocity), *persuasion* (e.g. opinionating, coalition formation, nagging/persistence and pestering), *emotional* (e.g. displays of positive and negative affect), *request* (e.g. direct ask, demanding,

informed requests), and *laissez-faire* strategies (e.g. taking independent action)". Another way to classify influence is through the use of overt behaviours indicating direct strategizing, e.g. requesting, begging, pleading; and secondly, by use of covert behaviour when the receiver is not aware of the strategies being employed by the influencer. Prange, Gotze, and Uhrovská (2009) have explained indirect influence in terms of its implication on the unconscious of the parents who try to fulfil their child's expectations knowing that their child will appreciate the token behaviour. While employing the best influence strategy, children remember and utilize the most effective strategy that has worked for them (Palan & Wilkes, 1997; Prange, Gotze, & Uhrovská, 2009; Thomson, Laing, & McKee, 2007) best explained by the trial-and-error method of learning. The success of the strategy is rooted in a series of decision episodes occurring over time that involves 'recount decision history' and number of successes (Flurry & Burns, 2005). With the success of their trial-and-error strategies, it yields confidence in relation to his/her own self-perceived relative influence (Bao, Fern, & Sheng, 2007) and repeat rewarded behaviour until it ceases (Flurry & Burns, 2005). Children also are able to perceive the resistance displayed by the parents and closely match them to the parents' response strategies and try to break the resistance (Prange, Gotze, & Uhrovská, 2009). Children have been noted to have an increased level of personal agency in contemporary families, which rejects the predicated ideas of child's socialisation 'transmission' model by Moore-Shay & Lutz (1988) that assumes that children model after the constraints, rules, and behaviour of their parents (Lawlor & Prothero, 2011). Other factors that affect family decisions invoked by children are family communication patterns (Hsieh, Chiu, & Lin, 2006; Kim, Lee, & Tomiuk, 2009), parental socialisation style (Bao, Fern, & Sheng, 2007; Carlson & Grossbart, 1988), family size (Caruana & Vassallo, 2003), and family type (Bates & Gentry, 1994; Flurry, 2007), other than their own individual demographics such as age (John, 1999; Moschis & Mitchell, 1986), gender (Wang, Holloway, Beatty, & Hill, 2007), and birth position (Flurry, 2007).

School based hypertension interventions

While substantiating school-based health educational interventions, it naturally upholds that primary school children are more receptive to health education that they have received during the early years of study (Bowen et al., 2007). Upon learning new behaviour, they are inclined to apply it in their daily lives without any additional obligation from health workers and adults (Greenberg et al., 2003). Since school-based interventions are usually group based, it partially helps children and teenagers in knowledge sharing and skill building which instigate them to form wise decisions (Harpine, 2008), enhancing their problem solving and decision-making skills. Age is a major consideration while planning health interventions. Children are more positively oriented towards new concepts and adapt better than adults to new behavioural changes. Children of age above 9 showed better communication skills in sharing health behaviour to other family members compared to children of age 6 who could maintain the behaviour themselves but were unable to dissipate the health behaviour to their siblings and parents (Thanh Xuan, Rheinländer, Ngoc Hoat, Dalsgaard, & Konradsen, 2013). This is because below a certain threshold, children have inadequate language development and have trouble maintaining focus on an issue for a very long period of time making them easily lose their interest. On the other hand, children above a certain maturation level, say between 8 and 11 years of age, can maintain their attention longer and hence can deliver better outcome in an intervention plan (Borgers, De Leeuw, & Hox, 2000). Borrowing the Piagetian theory of cognitive development, research studies have shed light upon the observation that children comprehend the meaning of health and illness specific to their age indicating the latent maturational cognitive development (Kalnins & Love, 1982; Bibace & Walsh, 1980). Their concepts of 'health' shifts from a state of behavioural engagement to more abstract concepts, corroborated by William and Binnie's (2002) finding who found significant difference in the understanding of the aetiology of different ailments of 4 years and 7 years old children. A

developmental trend was also observed in 667 Indian school children between classes 6 and 10, in which, apart from the emergence of the major themes of health, an entropy calculation revealed a steep rise indicating the divergence of ideas of higher-class children compared to the conceptual plateau in children of lower classes (Hariharan, Monteiro, Asha, & Rao, 2018). Another parallel study with similar investigation focussing on hypertension confirmed that children in their earlier years of development are able to conceptualize illness with a unidimensional view but with age progression, this view advances to accommodate and assimilate multi-dimensional themes of health and illness (Hariharan, Andrew, Kalavarapu, Rao, & Chivukula, 2018). Strengthening the child's ability to be a successful change agent of health requires appropriate education with correct information to fully equip them for the process of change. A simple and cost-effective intervention conducted in West Midnapore, India (Ray et al, 2016) on 2995 children of the 9th and 10th standard saw that children were confident to implement lifestyle changes after their knowledge had increased about the concept, prevalence, risk factors, role of healthy lifestyle practices and inherently the advantages of implementing the approaches learned. The most obvious benefit as a result of this intervention was their strengthened belief and capability to modify cardiovascular health. Aforementioned studies draw attention to the need of compatible educational approach. Associated with any educational approach are few barriers such as programme of study, limitation of time, teaching materials, and working atmosphere. To advance and modulate the knowledge foundation of children, it is vital that the baseline knowledge must be judged. Grasping the concept of health at an early stage of life assumes great significance as the cognitive base paves the path to future health promoting or health risk behaviour.

Theoretical framework

Hypertension presents its case in a debilitating form of physical disability, temperamental dysfunction, and even death. Although it is a grim picture, consistent efforts

can narrow its chances to endanger the life of the person. These efforts must be consolidated with the help of a team that can provide the correct educational information, and help link it with socio-emotional cues that navigate its way into non-compliance by tapping into the potential of children. Behavioural theories such as the theory of reasoned action, the health belief model, the trans-theoretical model, the theory of planned behaviour, and the information-motivation-behavioural skills (IMB) model, all of which specify determinants of behaviour that are potentially open to change, have frequently been used to develop behavioural interventions (Newman, Steed, & Mulligan, 2008). Amongst these, ‘Information-Motivation-Behavioural Skills Model for Health Behaviour Change’ has been duly considered as it provides a relatively simple explanation for complex health patterns and at the same time identifies constructs required for better self-management or adherence among patients with chronic disease (Deakin et al, 2005; Sabaté, & Sabaté, 2003). This model for health behaviour change proposed by Fisher and Fisher (1992) propounds the three constructs i.e. information, motivation, and behavioural skills. Delineation of the constructs specifically will pave the path of intervention strategy (Chang, Choi, Kim, & Song, 2014). Firstly, for the ‘information’ construct, disease-specific and behaviour specific information must be made available with execution of instructions using educational films, handouts, diaries, including teaching techniques such as interactive discussion, as intervention tools. For the ‘motivation’ construct, target should be to increase personal motivation which is appropriately utilized to form this study’s objectives in the form of children’s agency that could generate positive feelings and positive attitude towards behaviour change. Group based information is also sought to enhance perceived social support fulfilling the need for social motivation. In addition, other strategies, such as providing personal feedback and reflective listening can be incorporated to foster motivation both in children and secondary participants, the hypertensive family members. To quantify ‘behaviour’al skills, both perceived self-efficacy and objective skills could be translated into behavioural

interventions. In this study, this was practically applied by constructing the daily diary method along with the interim assessments of BP and compliance for the adults. Alongside, the length of intervention also helps in predicting the persistence of the behavioural change. Among studies that reported health behaviour changes after the behavioural interventions, one study that delivered a behavioural intervention for 6 weeks showed that the behaviour change persisted 12 months post-intervention (Pearson et al, 2007).

Summary

The extensive literature review has facilitated expansion of hypertension management strategies to invoke the power of children in modifying behaviour through practical and scientifically justified mediums. The studies considered have helped to develop insight into the key areas of this field of interest by streamlining and juxtaposing methods, applications, and evidence related to children's agency in health care and other fields. Other contextual corroborations, although unrelated to this study's prospect have also been taken into account as it helped to rationalize the stance of involving children in the system of hypertension interventions. While the focus was to build upon children's agency, a very lucid background of hypertension and its current scenario especially in India has been presented.

The primary route to successful restraint of the fatal condition lies in compliance to medication, diet, and exercise. However, due to several barriers hypertensive people lag in their daily prescribed therapy, although they are mostly modifiable with self-management. Self-management has been emphasized only in relation to the family of the hypertensive patient as they are the ones immediately and regularly available, and invariably affect the patient's prognosis. Various interventions have tried their level best to cater to the demands with limited success. Limitations in these interventions are further burdened by their cost and exhaustive dependence on external factors. Bringing in children to help flourish these interventions in a feasible and effective manner will help reduce potential financial and health burden of the

individual and nation. Group based or school-based interventions have been specifically highlighted as they can mould and teach the child with ease. Affiliation oriented families are oriented around the wellbeing of the child, and in reciprocity, the child must be aided with correct knowledge to support the needs of the health status of the family. The role of health psychologists has been underlined in the careful blend of medical, psychological and emotional requirements that need to be nurtured and accessed by the children in order to bring about determination and motivation for better compliance. The highlights of the study presented above help set down the aims and method to be employed in this study.

Rationale

Hypertension, being asymptomatic in its characteristics is described as ‘silent killer’. The incidence of hypertension has been showing a progressive increase globally as well as in India. The only preventive step from serious and irreversible consequences of this condition is effective management of the condition and maintenance of normal blood pressure. The literature indicates several behavioural and socioeconomic factors posing a hurdle to good clinical adherence, while an effective measure towards ensuring adherence would contribute not only to the health of the citizens but also reduce the economic burden of the nation. India being the affiliation-oriented culture, can encash upon the family bonding towards enhancing adherence among hypertensive patients. Among the family relationships, the literature clearly suggested the special role played by the children in family health care. Taking these aspects into consideration, this study is designed to examine if using the children as change agents for effective hypertension management of the adult family member. If children prove to be effective in this role, policy recommendations for including scientific knowledge about non-communicable diseases in the school curriculum and inclusion of monitoring adult adherence as school projects may prove low- cost effective interventions to enhance the national health.

For the present study, research questions were laid down, basing upon which, objectives and hypotheses were planned.

Research Questions

1. Is there a change in children's hypertension related knowledge due to the exposures of the hypertension intervention module provided to them?
2. Post exposure to the hypertension intervention module, do children function as agents of change in enhancing the level of hypertension knowledge, adherence to hypertension management, and managed blood pressure levels in their hypertensive adult family member?
3. Is children's agency, a function of their age, in hypertension management of their hypertensive adult family member?
4. What are the psychosocial factors in children that contribute to them being effective change agents?

Objectives

1. To assess if exposures of hypertension intervention module enhance children's hypertension related knowledge
2. To assess the effect of the hypertension knowledge intervention module provided to the children on hypertension knowledge, hypertension compliance, and blood pressure levels of their hypertensive adult family member
3. To assess if children's agency is a function of their age in hypertension management of their hypertensive adult family member
4. To track a pathway by identifying the psychosocial factors in children that contribute to their agency in hypertension management of their hypertensive adult family members

Hypotheses

1. The hypertension management intervention module provided to children will enhance their own hypertension knowledge level
2. Exposures of hypertension management intervention module provided to the children will change their hypertensive adult family member's hypertension knowledge level, their hypertension compliance level, and their blood pressure levels
3. Children's influence in hypertension management of their hypertensive adult family member will be a function of their age
4. The psychosocial factors in children that contribute to hypertension management of the hypertensive adults will follow a pathway through the hypertension intervention module

Chapter III

Method

CHAPTER III

METHOD

This chapter entails a detailed description of the (i) plan and design of the study, (ii) summary of the pilot study, (iii) sampling technique used along with inclusion and exclusion criteria, (iv) tools used, and (v) procedure of the study in order to fulfil the research objectives.

Plan and Design of the study

To address the objectives formulated for the research, a quasi-experimental interrupted time series design has been adopted as a framework for this study (Biglan, Ary, & Wagenaar, 2000). A paired sample of child and hypertensive adult from the family were studied for a period of 6 weeks to gauge the child's influence upon their adult family member towards hypertension adherence and its outcomes. To determine this, several clinical and psychosocial factors were assessed during the period of the study. The plan and design of the study is summarised in Table 3.1.

Table 3.1
Design of the study

Intervention & Day	Group (N= 362)		Children (n ₁ =181)		Hypertensive Adult Family Member (n ₂ =181)	
Pre - intervention assessment		a) HTN knowledge			a) Blood pressure recording b) HTN knowledge c) HTN adherence d) Type A e) Type D f) Perception of child's influence on adult	
Intervention 1 (Day 1)		b) Perception of child's influence on adult		Daily BP management Record Booklet (To be observed by children for 42 days; weekly monitoring)		
Intervention 2 (Day 7)		c) Achievement motivation d) Self-efficacy e) Personality				
Intervention 3 (Day 21)		f) Perseverance g) Frustration tolerance				
Post-intervention assessment (Day 42)		h) HTN knowledge			g) Blood pressure recording h) HTN knowledge i) HTN adherence	

It is relevant to reiterate here that the objective of the study is to examine if hypertension knowledge intervention to children with instructions to monitor the adherence in the adult hypertensive in the family has a positive impact on the adherence and hypertension control in the adult. Thus, in order to examine this objective, the design has a paired sample of the child and the corresponding hypertensive adult from the family.

As indicated in the table, the study was carried out in parallel for hypertensive adults and associated children. For the adults, the study was marked by two segments—one before intervention was provided to the children, the other, a follow up session post intervention. For the first segment, blood pressure readings were taken. Besides this, the adults were administered the Hypertension Knowledge Test, Hypertension Compliance Scale, Personality typing for ‘A’ and ‘D’, and Scale for Mutual Perception of Child’s Influence on Adult (for adults). In parallel, a total of four sessions were scheduled with the children comprising pre-intervention assessment. The children were administered the Hypertension Knowledge Test, the Scale for Mutual Perception of Child’s influence on adult (for children), the Achievement Motivation Inventory, the Self-Efficacy Questionnaire, the Big Five Questionnaire—Children version, the Short Grit Scale and the Frustrative Non-Reward Responsiveness scale in a staggered way. These pre-intervention assessments were followed by three sessions of hypertension knowledge intervention on Day 1, Day 7, and Day 21 of the intervention period. In addition to these, the children were asked to maintain a diary to keep record of their regularity in monitoring the adult hypertensive in the family. It comprised of a 42-day record of the three main regulating factors of antihypertensive control i.e., medicine, exercise, and diet (MED). This was submitted to the investigator every week. The finality of the study was achieved with a follow-up on Day 42 in terms of re-evaluation of hypertension knowledge for both adults and children; hypertension compliance and blood pressure recording for adults only.

Main Study

Participants

A pair of child and adult hypertensive family member comprised a unit of the sample in the study. Data was collected from thirteen English medium schools catering to the middle socioeconomic population of two major metropolitans of India—Delhi and Kolkata.

Inclusion criteria. (i) Children aged between 11 and 14 years of age studying between Class 6 to Class 9; (ii) Hypertensive adults paired with each child should have familial relationship; (iii) Hypertension diagnosis for adult should have been minimum for a period of 1 year; (iii) the pair must be residing in the same house; (iv) the pair is able to read, or write, or communicate in English or Hindi or Bengali language without assistance; (v) the pair is able to understand and willing to participate in study by signing informed consent.

Exclusion criteria. (i) Participants known to have any known psychological / psychiatric morbidity.

A total of 13 schools were incorporated covering a period of 9 months to be able to recruit 252 pairs of participants. Due to subject attrition during the follow up the final sample was 197 pairs of participants. There was a drop out of 21.83% of subjects. Based on outliers, there was further drop of the number of participants to 181 participants.

Details of participants

The demographic characteristics of the two sets of the sample are described below:

Hypertensive Adults: Among the adult hypertensive adults, 43.09 % of the sample are men ($n=78$), whereas 56.9 % of the sample are women ($n=103$). The mean age of all hypertensive adults was 48.65 years ($SD=\pm 11.98$). The education level of this group was categorized as non-literate (12.15%); basic education, i.e., at least 10th and 12th standard (24.86%), and graduate and above (62.98%). The average duration of hypertension diagnosis was found to be 4.48 years ($SD=\pm 3.16$).

Children: The children belonged to Class 6 (38.67%), Class 7 (29.83%), Class 8 (26.52%), and Class 9 (4.97%); and comprised of 110 boys (60.77%) and 71 girls (39.27%). The age range of the children was between 11 years to 15 years ($M=12.0$; $SD=\pm 1.15$). The relationship

between child and hypertensive adult consisted of 1 brother (0.55%), mothers (30.93%), fathers (28.88%), aunts (6.63%), uncles (2.21%), grandfathers (11.05%), and grandmothers (3.27%).

Tools

Assessments were carried out for both child and hypertensive adult family member. Hypertension Knowledge Test (HKT) was administered on both. Apart from HKT, the adult's blood pressure was measured using an automatic digital sphygmomanometer, along with assessment of Hypertension Compliance (HyCompS), Scale for Mutual Perception of Child's influence on adult (for adults) (SMPCIA - A), Simplified Type A Questionnaire (STAQ) and the Type D scale (DS14). For the children, other than HKT, Scale for Mutual Perception of Child's influence on adult (for children) (SMPCIA – C), Achievement Motivation Inventory (AMI), Self-Efficacy Questionnaire for Children (SEQ – C), Big Five Questionnaire – Children version (BFQ – C), Short Grit Scale (SGS), and Frustration Non-Reward Responsiveness Scale (FNRS), were administered. The content, application, and development (where applicable) are discussed in this section.

Personal Details Form. A form was used with the consent letter for the adults to record demographic details such as name, age, gender, duration of diagnosis of hypertension, and relationship with the child. In case of children, their name, age, class, gender, school, and relationship with adult was requested to be noted.

Blood pressure reading. A digital sphygmomanometer was used at the time of pre-intervention assessment session of adults and once again when the post tests were conducted. The instrument was calibrated and matched with the manual apparatus and found to be correct in recording the Blood pressure. The blood pressure in terms of systolic and diastolic pressure was recorded thrice in an interval of 10 minutes each and the average was recorded. For the

purpose of the study, the systolic and diastolic blood pressure recording was converted into a unified representative value—mean arterial pressure or MAP (DeMers & Wachs, 2020).

The standard formula by for conversion used was:

(MAP = diastolic pressure + $\frac{1}{3}$ (systolic pressure – diastolic pressure)).

Hypertension Knowledge Test (HKT). HKT is a comprehensive 22 item tool developed by Andrew and Hariharan (2017) to measure the level of knowledge pertaining to hypertension. Each item comprised an incomplete statement with 5 multiple choice options, last option being ‘do not know’ to minimise guesswork. The participants were requested to respond to each item by ticking only one correct answer from the options. Total HKT score is also further subdivided into four aspects of hypertension knowledge i.e. ‘General Awareness’, ‘Lifestyle’, ‘Causes, Care, and Causalty’, and ‘Management of Medication’. Each of these dimensions provides the sub-total scores highlighting the strong/weak areas in the arena of hypertension knowledge. This tool is user friendly and vivid in cutting out a grid of the level of hypertension knowledge, making it an ideal benchmark tool to assess any changes due to hypertension knowledge intervention. The tool has achieved high test-retest reliability overall and across sub-domains ($\alpha = 0.92$); and showed highly significant negative correlation with controlled blood pressure group, thus establishing worthy construct validity. Cronbach’s α reported for the study was 0.48 for administration of the scale on adults and 0.44 in the case of children’s score. The homogeneity of the group in terms of knowledge exposure must be the cause of low reliability in this case.

Scoring. Each item had only one correct option which was given a score of ‘1’. All incorrect responses and ‘do not know’ responses were scored as ‘0’. The various items under each subscale are as follows: General Awareness—5 items (1,4, 9,18,22); Lifestyle Factors—5 items (2, 3, 10, 19, 20); Causes, Care and Casualty—6 items (6,7,8,12,16,21); Medication Management—6 items (5,11,13,14, 15, 17). The sub-totals of each dimension add up to the

overall HKT score which ranges from 0 to 22. Higher scores suggest higher levels of knowledge about hypertension.

Hypertension Compliance Scale (HyCompS). HyCompS (Swain, Hariharan, Rana, Chivukula, & Thomas, 2015) was developed to measure clinical compliance towards hypertension management with a referred time frame of past 1 week. It is a 15 item scale with both positive and negative connotations used to assess sub-dimensions of compliance, i.e. medication (Items 1, 2, 7, 8, 9, 10, and 11), diet (Items 3, 4, and 5), exercise (Item 13, 14, and 15), and lifestyle and self-monitoring (Items 6 and 12), totalling up to holistic medically advised compliance in hypertensive persons. This scale was chosen as an apt measure for clinical adherence of hypertension management and to assess any changes after the interim. The validity of the scale was established on an Indian sample, and the Cronbach's α was found to be 0.67. For this study, Cronbach's α was found to be 0.62.

Scoring. Each item's response is measured on 4 point Likert Scale ranging from '1' signifying 'not a single day in a week' to '4' signifying 'almost every day in a week'. A fifth option was also provided as 'do not know / not applicable'. The score range for the first domain—compliance to medication, is between 0 and 28. For the other two domains i.e., compliance to diet and exercise, the score range is between 0 and 12. For the domain of lifestyle and self-monitoring, its score ranged between 0 and 8. Overall hypertension clinical compliance is the sum total of all the domains ranging between 0 to 60, indicating that higher the score, better is the compliance. Items 6, 12, and 13 were negatively worded; hence the scoring is reversed for these items.

Simplified Type A Questionnaire (STAQ). It is a short self-report scale to assess Type A characteristic behaviour in primary healthcare and was developed by Karlberg, Krakau, Sjöden & Anna- Undén (1996). This scale has 10 items with response type in the adjoining

column space with three options – “Fully Agree”, “Partly Agree”, and “Don’t Agree at All”. The responses were scored 0 to 2. The items of this scale aim to identify significant and treatable features of Type A behaviour. Few examples are: “I find myself hurrying even when I am not in a hurry”, “I often know better than those who decide.” The Cronbach’s α was found to be 0.70. Its criterion validity with another validated self report measure was 0.60. The STAQ has good psychometric properties and has an acceptable discrimination capacity. Type A behaviour is highly correlated with the probability of coronary heart diseases of which hypertension is a major risk factor, therefore making this concise test form an appropriate screening tool to predict Type A disposition in individuals. For this study, Cronbach’s α was observed at 0.67.

Scoring. The responses were respectively marked as 0, 1, and 2 for the three option types—“Fully Agree”, “Partly Agree”, and “Don’t Agree at All”. The score range was between 0 and 20. Higher the score, better the prediction of Type A characteristics.

DS-14. This tool was developed by Denollet (2005) in order to screen for negative affectivity (NA) and social inhibition (SI) which jointly predict distressed or Type D personality characteristics known to make individuals more vulnerable to chronic distress and in turn negatively affecting health outcomes, in this case, hypertension management. This scale has 14 items with equal division of 7 items in each domain, Negative Affectivity (NA Items 2, 4, 5, 7, 9, 12, and 13) and Social Inhibition (SI Items 1, 3, 6, 8, 10, 11, and 14). For this study, Cronbach’s α was 0.77.

Scoring. The response pattern is in a 5 point scale labelled from 0 to 4, where 0=False, 1=Rather False, 2=Neutral, 3=Rather True, 4=True. The subtotal of NA and SI are the sum total of its respective items, where only Items 1 and 3 are to be scored in reverse. The score range for both the subscales is from 0 to 28. A clear cut-off is determined and the scores are

categorised. However, in case of NA, men have slightly different categorisation i.e. Very Low (0), Low (1), Below Average (2-3), Average (4-6), Above Average (7-10), High (11-16), and Very High (16-28). On the other hand, women are categorised like Very Low (0), Low (1-2), Below Average (3-5), Average (6-8), Above Average (9-12), High (13-18), and Very High (18-28). Such difference in categorisation does not happen in case of SI where irrespective of gender the scores are categorised as Very Low (0), Low (1-3), Below Average (4-7), Average (8-11), Above Average (12-15), High (16-21), and Very High (22-28). To determine a dominant Type D personality a cut-off score of 10 is obtained on both domains.

Achievement Motivation Inventory (AMI). AMI is a 32 item scale was developed by Muthee and Thomas (2009) to assess achievement motivation among Indian school students making it an appropriate tool to measure the variable owing to the cultural context in which it was prepared. It has positively worded items (Items 3, 4, 5, 6, 11, 13, 14, 16, 17, 20, 23, 24, 26, 28, 29, 30, 31, 32) and negatively worded items (Items 1, 2, 7, 8, 9, 10, 12, 15, 18, 19, 21, 22, 25 and 27) too. Cronbach's α computed for the scale was found to be 0.75 indicating that the scale has satisfactory internal consistency reliability. Validity for the scale is claimed on the basis of the fact that it is modelled after well-known inventories meant for measuring achievement motivation. For this study, Cronbach's α was found to be 0.66.

Scoring. It has a 5 point Likert scale format where the points are 'completely agree', 'mostly agree', 'agree to some extent', 'mostly disagree' and 'completely disagree'. The positively worded items are scored as 5, 4, 3, 2, 1 whereas negatively worded items are reversely scored as 1, 2, 3, 4, 5. The sum total of all items indicates the level of achievement motivation of school children. Higher the scores, higher the achievement motivation.

Self Efficacy Questionnaire for Children (SEQ-C). Muris (2001) purported the 24 item SEQ-C to measure children's perceptions of their self-efficacy in terms of 3 eight item

subscales—social self-efficacy (Items 2, 6, 8, 11, 14, 17, 20, and 23), emotional self-efficacy (Items 3, 5, 9, 12, 15, 18, 21, and 24), and academic self-efficacy (Items 1, 4, 7, 10, 13, 16, 19, 22). The subscales may be interpreted independently and therefore are of interest to the study to assess the confidence of the child to exert action. Internal consistency (alpha) estimates ranged between 0.85 to 0.88. For this study, Cronbach's α was found to be 0.82.

Scoring. The responses follow a 5-point endorsement statement with each item to be scored between “1” meaning ‘not at all’ and “5” as ‘very well’. The total self-efficacy score is obtained by adding the scores of all items ranging from 0 to 120. Each subscale score is acquired by adding the scores of their respective items. It has equal number of items in each subscale, hence score range for each subscale is between 0 to 40.

Big Five Questionnaire for Children (BFQ – C). BFQ-C is a personality report of the Big Five characteristics—Energy/Extraversion, Agreeableness, Conscientiousness, Emotional Instability, and Intellect/Openness, designed specifically for children and adolescents. It was developed by Barbaranelli, Caprara, Rabasca, and Pastorelli (2002). The questionnaire is made of 65 brief phrases, 13 phrases each accounting for the 5 characteristics. The items under each Big Five factor are specified respectively: Energy/Extraversion—(items 1, 9, 14, 19, 23, 26, 35, 40, 42, 50, 55, 57, 63), Agreeableness—(items 2, 11, 13, 16, 21, 27, 32, 38, 45, 47, 51, 60, 64), Conscientiousness—(items 3, 7, 20, 22, 25, 28, 34, 37, 44, 48, 53, 56, 65), Emotional Stability—(items 4, 6, 8, 15, 17, 29, 31, 39, 41, 49, 54, 58, 61), Intellect/Openness—(items 5, 10, 12, 18, 24, 30, 33, 36, 43, 46, 52, 59, 62). For this study, Cronbach's α was found to be 0.92.

Scoring. The personality is estimated in terms of the Big Five dimensions. The response format is in the form of a 5-point Likert scale ranging from 1 indicating “Almost Never” to 5 indicating “Almost Always”. The sum total of the 13 items in each dimension reflects the score of the

personality factor. The score range is between 13 to 65 for each factor. Higher the score suggests higher dominance of the particular personality factor.

Short Grit Scale (Grit-S). This was developed by Duckworth and Quinn (2009). It is a brief self-report measure of perseverance prototypical of the study's need to assess passion and effort for a long-term goal. It has 8 items and follows a 5-point Likert format, with options varying from "Very much like me, Mostly like me, Somewhat like me, Not much like me, Not like me at all". For this study, Cronbach's α was found to be 0.34.

Scoring. A weightage of 1 to 5 is given to the Likert response format depending upon the item. For questions 2, 4, 7 and 8, a weight of 5 is assigned to 'Very Much Like Me' and sequentially 'Not Like Me at All' gets a weight of 1. For questions 1, 3, 5 and 6 the reverse is assigned, where 'Very Much Like Me' is given a weightage of 1 and sequentially 'Not Like Me at All' gets a weightage of 5. The final score is obtained by calculating the sum total of all items which is then divided by 8. The maximum score that can be obtained on this scale is 5 suggests an extremely gritty characteristic, whereas the minimum score of 1 suggests 'not at all gritty'.

Frustrative non-reward responsiveness subscale (FNRS). This scale was developed as an extension to Behavioural Approach System (BAS), the Behavioural Inhibition System (BIS) by Wright, Lam, & Brown (2009). This scale purports to measure lowered approach motivation in the event of losing a goal or quitting or non-reward, using 5 brief items. For this study, Cronbach's α was found to be 0.55.

Scoring. The four point fully-anchored Likert scale was applied to the FNRS items, labelled from 1 (very true for me) to 4 (very false for me). The scores obtained are reversed before computing the total. High scores indicate higher frustration following non-reward.

Scale for Mutual Perception of Child's influence on adult (SMPCIA). This scale was developed for this study to assess the quality of interpersonal relationship between adult family member and child—the paired participants of the study. The content of this scale was designed

based on an exhaustive review of literature and ideation of a healthy, communicative, and mutually influential relationship between child and adult. An item pool was generated where a mixed bag of 51 favourable and unfavourable items were formulated. The investigator along with the Research Guide condensed the pool to 30 items based on content, relevance and value addition of item to the study. Further, essentiality of the items was tested by providing the item list to 13 field experts for their judgement of the item as essential or non-essential pertaining to the research objective of the study. The agreeableness of the essential items was retested with experts who agreed to re-evaluate the items (conducted within a fortnight of the first evaluation). Based on the input received, the content validity ratio was calculated for each of the items. Content validity ratio of higher or equal to 0.54 was found for 17 items. Further, the items were duplicated but the active voice of the sentence was changed, and the form for adults was designated as SMPCIA – A, and SMPCIA – C was labelled for children. There were 30 items that were designed in statement form about the quality of time spent with each other, amount of time the adult spends with the child, type of interaction, frequency of disagreement, fulfilment of child's demands and requirements, and importance and role of the child in the family. The statements reflected the inter-dependability of the child and adult in a familial context. During the pilot study, the feasibility of the items and reliability in terms of internal consistency and test-retest reliability was assessed with the sample. The retest of the scale was done along with the post-intervention testing at 6 weeks from the commencement of the study. The scale was found to be feasible, well comprehended, and both forms had good correlation with each other. For Form A, internal consistency or Cronbach's α was found to be 0.73 whereas its test-retest reliability was found to be 0.66 ($p < 0.01$). For SMPCIA– C internal consistency or Cronbach's α was found to be 0.71 and its test-retest reliability was found to be 0.61 ($p < 0.01$). For the main study, Cronbach's α was found to be 0.62 for adults, and 0.72 for children.

Scoring. The responses formatted as a 5-point Likert scale labelled as “Almost Always”, “Sometimes”, “Rarely”, “Never” assigned as 4, 3, 2, and 1. Half the items, i.e. items 4, 5, 6, 8, 10, 12, 13, 18, 19, 20, 21, 23, 26, 29, and 30 were negatively worded hence the weight assigned to the labels change direction and goes as 1, 2, 3, 4. The sum of the item scores of each form is the total score of the particular form. Higher score indicates better perceived relationship of child/adult. The scores were used to derive the mutuality in the perception of the child and the adult to understand the confluence in their perceived relationship.

Hypertension Management Record Booklet. The active role of children to achieve managed blood pressure levels of their adult hypertensive family member was encouraged through the record of a daily diary as a part of the intervention module. The diary was a record booklet comprising of daily record of compliance to medicine, exercise and diet, called the ‘MED’ book. The children were asked to remind ‘their patients’ to take their medicine, exercise, and follow the prescribed diet. The child recorded in terms of ‘Yes’ for successful monitoring, ‘No’ in cases of non-compliance with the reminder, and ‘Don’t Know’ when the child failed to remind or intervene in the prescribed medicine and lifestyle regulation (through diet and exercise).

Intervention. Intervention was provided to the enrolled children of the study in terms of audio-visual knowledge module, informational booklet, and discussion.

Hypertension Knowledge and Management Informational Video. This is a 30 minutes long video clipping where a medical professional spoke about hypertension using a slideshow with pictures and animations. The video informs about the current prevalence and dangers of uncontrolled hypertension and importantly the unawareness surrounding the chronic disease leading to poor management and severe health consequences. It illustrates the approximate onset age of the disease, probable symptoms, consequences in case of uncontrolled state, state of the body suffering from hypertension and its associated risk factors. The measurement of

blood pressure and comprehension of the blood pressure recordings is demonstrated advocating the value of compliance to prescribed medicine, dangers of substituted or missed dosage, highlighting alongside the significance of lifestyle changes, dietary changes. The viewer is also educated on understanding indications in case the BP shoots up above its limit and the person requires immediate medical attention. The emphasis was on the need for adherence and the repercussions of non/low adherence.

Hypertension Information Pamphlet. The pamphlet reiterated the information provided in the video for the children participants to help form a concrete knowledge base about hypertension supplementing the education from the video and discussion about hypertension.

Role of health psychologist. The health psychologist moderated the educational sessions with the children and discussed the importance of their role in building good health for themselves and their adult hypertensive family members by encouraging minimal but powerful involvement in daily regulations of lifestyle habits. The record booklet was observed weekly to nurture a sense of achievement in the children building upon their agency in helping maintain and conditioning self towards good health habits. Reflexively, the health psychologist was instrumental in using different principles of psychology such as force-field analysis, reinforcement principles, and enhancing agentic beliefs of the children through warding of strategies and methods that they could use to constructively reach their set daily goals.

Procedure

Ethical clearance and permissions. Prior to the commencement of the pilot study, the prerequisite clearance was obtained from the Institutional Ethics Committee at the University of Hyderabad (Appendix D1) before the commencement of pilot testing. The scales used in the study were obtained from the public domain, and therefore used without seeking permission from the respective authors. The scales were translated into the Hindi following standard procedure. To finalise the locations of data collection, convenience in terms of language and

geographical coverage were considered, therefore New Delhi and Kolkata were selected for the study. Several school heads and management were contacted using snowballing and reference. The schools which showed an interest in incorporating the study were approached to elaborate the study design, and were given a permission letter (Appendix D2) procured from the Supervisor and Head of Department, and were requested to allow conduction of the study that was confirmed in writing. After having obtained permissions from institution heads, a teacher was allotted at each of the schools to work with the investigator to help build rapport with the students and to aid fluency of the data collection. Before taking up the main study a pilot study was conducted to test the feasibility of tools as well as the intervention module.

Pilot study

Method

An independent pilot study was conducted to assess the practicability of the interventional study on a small sample. In addition, several factors of the data collection process were assessed—relevance of consent forms, enrolment and dropout rates of participants, inclusion and exclusion criteria, testing of existing and new instruments, formulation of schedules, time taken to administer sessions and instruments, ideal duration of follow up, observation of non-verbal behaviour of participants; all of which helped to determine the prospective sample to improve the important features of the main study. The pilot study was a significant training ground to help familiarise with all aspects of the study. The details of the study are presented below.

Firstly, rapport was developed with all the students from Class 6 to Class 9 briefing them about the study and providing them with an invitation letter along with consent form for their hypertensive family members to participate in the study. The invitation letter and consent form contained detailed information about the study and the eligibility of family members suffering from hypertension who could participate in the study as well as the date of the

recruitment session. The students were requested to bring back the consent forms to school next day to gauge the number of participants that would be present on the day of recruitment. On the designated day, stations were created where family members of children were seated and they were elaborately explained the purpose, timeline, and procedure of the study. Their blood pressure was also recorded in due course of the session, and the questionnaires were administered on them. It took about 40-45 minutes of time for each person to complete their session who were attended individually from time to time. With the recruited list of adult participants, their corresponding children were gathered the next day of recruitment to help understand their role in the study. The first session, i.e. *Session I* had three objectives—to administer the pre-test questionnaires, conduct the hypertension education intervention, and introduce the record booklet to the students. The pre-test questionnaires consisted of the *HKT* and the *SMPCIA - C*. The second session or *Session II* consisted of the collection of 1st week record sheet from the record booklet, a repeat of the hypertension education intervention, and additionally hypertension educational pamphlets were distributed among the children participants. The contents of the pamphlet were discussed in details. Also, portion of the other psychosocial assessments were administered on the students. All participants were debriefed at the end of the study.

Sample

A total of 43 pairs of students and their hypertensive family members were recruited from four schools. This was done using purposive sampling technique. The sample included 13 boys and 30 girls between Classes 6 to 8 and between the age range of 11 years to 14 years. The sample of adult participants comprised of fathers, mothers, grandfathers, grandmothers, and aunts and age ranging between 28 to 75 years ($M = 48.02$; $SD=5.91$). Classified according to their education level, there were 12 graduates and 31 with little to no basic education. The mean duration of their hypertension diagnosis was 6.67 years ($SD = 5.91$).

Procedure

Permission was procured from school administrations to conduct the study. The study was intended for a period of 3 months but due to practical reasons of examination and vacation schedule of schools, the time period of follow up was reduced to 6 weeks or 1.5 months. After a schedule was set, one teacher was assigned to the study to facilitate the investigator to smoothly conduct the study. First, all the parents were sent an invitation letter to participate in the study. It also had a Patient Proforma which allowed them to fill details of the family members who were diagnosed with hypertension, duration since diagnosis, and their relationship with the child. For those who agreed to participate an informed consent form was also sent in order to apprise the potential adult hypertensive participant about their participation in the study. The assent of the children of the paired hypertensive adult family members was taken from them and their parents. Only participants with complete informed consent and assent were included in the study.

Conduction of the study: The base line data was collected from recruited children and adult hypertensives of the study.

Data recorded for patients with hypertension: The systolic and diastolic readings of BP (blood pressure) were recorded using a digital sphygmomanometer. Apart from this the participants were administered the HKT, the HyCompS, DS14, STAQ and SMPCIA-A.

Parameters recorded for children: The children were tested for hypertension knowledge prior to and following intervention. Apart from this, they were administered the SMPCIA-C, the AMI, the SES, the BFQ-C, the SGS, and the FNRS.

Intervention for the children: The children were shown a video that covered all aspects of hypertension explained by a physician. This 30-minute video was scheduled on Day 1, Day 7,

and Day 21 from the onset of study. A thorough discussion of the video was carried out to ensure a strong cognitive base for the children.

Orientation on the role of children to monitor the adult hypertensive in the family:

Children were imbibed into the hypertension intervention module by orienting them towards an activity that would help them monitor and keep track of their adult hypertensive family member who were entrusted upon them as ‘their patient’. Children were instructed to ensure that their patient was taking their medicine on time; followed a lean diet that was low in fat and low in salt; and did their regular physical exercise regimen as per doctor’s advice. This was recorded by them daily on the hypertension monitoring booklet provided to them by the investigator. This booklet was demarcated in terms of date, medicine, diet, and exercise for every week. If the children observed that the hypertensive adult family member aka patient had followed all the parameters of compliance, i.e., medicine, diet, and exercise, they were instructed to mark it as ‘Yes’ under the designated place. In cases when they forgot to monitor or were unable to do so because of a compelling reason, they were instructed to write “Forgot” under each date. These records were collected weekly by the investigator, and were maintained for a period of 6 weeks.

Results

The data from the pilot study comprised a small sample of 43 pairs, hence only the main factors such as, change of hypertension knowledge, change in hypertension compliance was warranted to test the operational model of the design. The results of the pilot study have been published (Appendix F). The significance of the results was an indication about the effectiveness of the main purpose of the design.

Insights from the Pilot test & Changes Introduced

The pilot study proved to be very advantageous in gaining insights and learning better management from the smaller field of administration. There were several challenges that were

faced in the pilot study in terms of briefing, design implementation, tool administration, and procedure. Each challenge also welcomed solutions that were implemented during the pilot study and incorporated in planning of the main study. Firstly, the research design originally developed was theoretically robust but lacked practicality as the time series for intervention and follow up was for a period of 3 months. However, akin to the academic calendar of the schools, it was not possible to keep a long interim for follow up as it was interrupted either by examination or vacation causing a lapse in subject and investigator interaction. Taking cue from this, the duration of the intervention period was reduced without violating the study's objective from 3 months to a moderate 6 weeks or 1.5 months. Trailing, participant recruitment was exigent. In supplement to sending invitation notes, the parents and guardians of the wards were also confronted during social events of the school such as parent teacher meet, exhibition, cultural events, etc. The teachers appointed by the school to aid execution of the study were invaluable in terms of briefing the parents about the importance of this study. Apart from this, school administration's flexibility also played a vital role in arranging equipment for viewing the video, allowance for the participants to compensate for their classes, and seamlessly accommodating the schedule of the investigator. Thirdly, tool administration was observed to have prime importance so as to avoid fatigue or practice effect on the part of the participant, especially the children. To tackle this, the tools were spread out over the sessions, limiting prerequisites for pre-testing phase and post-testing phase, and stable personality characteristic assessments between intervention sessions. Fourthly, during the intervention program, it was observed that children were taking a keen interest in understanding the anatomy and functioning of the cardiovascular systems, although it was observed that they found it difficult to sustain attention continuously for 30 minutes given the gravity of the topics discussed. To make the sessions more interesting, the videos were paused at two intervals used by the investigator to provide a summary of the contents so far. In order to make the sessions goal

oriented, power points were also made to help children understand the flow of the psychoeducational program. Not the least, local language of the children (after taking consent that each child was familiar to it) was also used to make the sessions interactive and meaningful for the children. Understanding the dynamics of subject recruitment and sustenance in a longitudinal study also pointed out the necessity to engage and reinforce the children intellectually (through discussions and feedback) and behaviourally (praise and appreciation by investigator and teacher for consistent and honest effort). Several other circumstantial challenges were also contested which helped the investigator in terms of mental set/readiness for dealing with unforeseen problems. To accommodate all the solutions, main study was planned and organized to implement the goal of hypertension education and management optimally.

Main Study

Based on the insights from the pilot study, the main study was refined without compromising on the objectives of the study. The design of the study was finalized (Refer Table 3.1). Several schools were contacted to conduct the study, and a total of 10 schools conformed to the understanding and requirement of the study. The schools were homogenous in nature, i.e. they were English medium schools and catered to the wards of the middle socioeconomic population. The study was conducted was firstly conducted New Delhi during July to September 2019, after completion of which it was conducted in Kolkata during October 2019 to January 2020. Another set of schools were also inducted in January 2020. The conduction of the study was through March 2020. For smooth functioning of the study, a timetable was developed and each day was dedicated to a particular school. Weekly timings were determined with the teacher in charge of the school. This helped to avoid latency due to incompatible timings. The finalization of the timetable helped set the pace of the study with each administration and intervention session earmarked for a particular school for a particular

day. This also helped accommodate and allot extra time incase a student was unavailable, had examination, or if the day was on a festival or school function. The day was adjusted on other working days with prior communication with teacher in charge. The timetable was developed for adults as follows—Day 1 (session for recruitment and session for pre assessment), and Day 42 from the beginning of the study (to collect post intervention assessment data). For the children, a day of the week pre-set by school authorities and investigator was fixed.

Process of recruitment. To commence the study, rapport was built with all the students from Class 6 to Class 9 briefing them about the study and providing them with an invitation letter along with consent form for their hypertensive family members to participate in the study. The invitation letter and consent form contained detailed information about the study and the eligibility of family members suffering from hypertension who could participate in the study as well as the date of the recruitment session. The students were requested to bring back the consent forms to school next day to gauge the number of participants that would be present on the day of recruitment. The adult family members were contacted via the school or if their contact numbers were provided, they were communicated about the date of recruitment and assessment.

Administration of assessments and interventions. For ease of understanding, it is reiterated Day 1 comprised of the recruitment session of the hypertensive family members of the children who had deposited the invitation letter BP measurement of adult candidates, pre-assessment of HKT, HyCompS, STAQ, DS14, and SMPCIA-A. The adult participant recruitment was done meticulously. Each individual was made comfortable on arrival. The adults who had arrived together were briefed about the study together. All doubts were clarified individually. With each individual, a few minutes were spent in ascertaining that they met the inclusion criteria of the study. Each individual was then provided with the personal details form along with other assessment forms, however, they were requested to attend to them only upon

receiving instructions. It was made sure that no more than 10 people were seated in a single room to maintain a peaceful ambience. After completing preliminary formalities, they were asked to begin recording their response in the forms given to them. Meanwhile, one by one each of their blood pressure was recorded. This activity was again repeated for everyone ensuring a gap of 10-15 minutes at least. When everyone had completed recording their response, the forms were collected from them, and they were debriefed about the future course of the study and were requested to visit again on the designated day (6 weeks from the day of recruitment). This whole session took approximately 1 hour for each of the participants. There were participants who could not adhere to the time given but were accommodated separately nevertheless.

With the recruited list of adult participants their corresponding children were gathered the next day of recruitment and were explained the purpose, timeline, and procedure of the study and to understand their role in the study. The teacher in charge was present at all times who facilitated the conduction of the sessions, and ensured clarity in communication between students and investigator. No more than 15 students were enlisted into each session. If there were more than 15 in each session or if few children were unable to attend due to some important class, a separate session was repeated on the same day for the rest. In the event that more than one student was absent for any session, a separate session was conducted for them on another allotted day. If a child was absent on more than 1 day, the teacher in charge would debrief them and they were dropped from the study. Firstly, their informed consent was collected. The first session, i.e. *Session I* on Day 1 for children had three objectives—to administer the pre-test questionnaires, conduct the hypertension education intervention, and introduce the record booklet to the students. The pre-test questionnaires consisted of the *HKT* and the *SMPCIA- C*. For the intervention specifically, certain requisites were made to the school such as audio-visual facility, a microphone for audio clarity, and table chair for all the

students. In the first knowledge intervention session, the 30 minute video was shown to the children on a large screen, with a single break at 15 minutes to acclimatize the attention process to the new information perceived by the children. Hypertension knowledge pamphlets were distributed to each of them so that they could refer to it in case of any doubt. A discussion took place at the end of the session, to summarize the session and clarify any doubts. The record keeping activity was introduced to the children and each were motivated and assigned the responsibility to monitor their hypertensive adult partners daily, and check whether they have taken their medicine, adhered to their exercise and diet regimen. They were assured that this task implied no penalty and were intrinsically motivated towards better health outcomes for their adults and were trained as medical aides. This was to instil confidence among them. They were repeatedly affirmed that if due to any event they forget or are unable to fill the information within time, they need not falsify any information, and simply mention that they ‘Forgot’ as it did not entail any negative consequences. The next session date was reminded to them. This duration for whole session was roughly 1 hour 15 minutes. For *Session II* (on Day 7), the children were gathered in the same setting as previous. First, the first week’s recording from the record booklet was collected from them and they were asked to get any doubts cleared, if any. Next in agenda was the repeat of the hypertension knowledge intervention. This time, the intervention was given a break twice at 10 minutes interval. At each interval, the content was summarised to engage the children in the video. After the end of the video, discussion was initiated and the pamphlet’s content was also summarized. Children were also asked to share their experiences of their first week of monitoring. The psychological tests to measure achievement motivation and self-efficacy were also administered as these are characteristics that are relatively stable and unchanged due to interventional effect. This session also lasted for about 1 hour. Between session II and III was a gap of one week. During this week, the investigator met the children participants to collect the weekly record booklet for the past week,

and administered the personality questionnaire which was the longest test of 65 items. The duration for this was approximately 30 minutes. Additionally, the investigator discussed about any obstacles they faced and their experience of the role so far and feedback was given to them. Important observations were noted from time to time by the investigator. The subsequent week was the 4th week of the study, and *Session III* of the study was conducted. In this session, the weekly records were collected firstly, and then a repeat of the audio-visual hypertension knowledge video was broadcasted for them to strengthen their grasp of the topic. An elaborate discussion and feedback session followed. Further, two short scales of frustrative non-reward responsiveness and grit were administered marking the end of all pre-assessment and psychosocial measurement of the children's characteristics. In the following two weeks before post testing phase, children were met on the pre-set dates and weekly record sheets were collected from them. At the end of 6 weeks, the final session with children was conducted. They were tested again for hypertension knowledge to help measure changes in their knowledge due to the intervention. After the post test data and weekly record was collected, all the children were congratulated for their role undertaking and genuine participation. They were reminded to request their adult hypertensive partners to visit the school for a post-test administration. The last session took about 30 minutes to complete.

The adult participants were contacted via the school administration to remind them of their due visit in order to complete the session. This phase was observed to have a dropout of many participants as many promised to visit but did not turn up and a few did not respond to the call. Their data was eliminated from the study. For the post intervention session for the adults, they were comfortably seated. They were provided with their post-test forms of HKT and HyCompS. Simultaneously one by one, each person's blood pressure was recorded. This measurement was repeated once more after a gap of 10 minutes at least. Once all the forms were collected, all the participants were debriefed and thanked for taking part in the study

diligently. The adults also had a chance to verbally share their experience about how the intervention brought any change in their lifestyle, if at all. The end session took between 30 to 45 minutes per person.

On the last day, the teacher in charge, school authorities, and staff who helped in the successful administration of the study were thanked for their support. It is imperative to highlight of the teacher in charge's role in the study as they were familiar to the children and provided them with any technical assistance. Importantly, the teachers were an effective facilitator of communication between investigator and school. The teachers also made sure that children arrived at the session in time, preparing, and reminding them in advance. The teachers would also remind the children one day in advance to get their weekly record, and this greatly helped to avoid any lapse in data collection. Despite the reminders if someone forgot to get their weekly record, it was collected by the teacher in charge the next day. This assured consistent accountability on the part of the children even in the absence of the investigator. In cases where frequent omissions or 'Forgot' or 'Don't Know' was reported, the teacher also helped to find out of difficulty in data recording by the children. In extreme cases of missing information, the data was dropped for the entire panel. In less severe slips of data recording, the data was entered as missing or 'Forgot / Don't Know'.

Chapter IV

Results

CHAPTER IV

Results

Four objectives were delineated for the study. The first objective of the study included finding out if hypertension knowledge intervention module made a difference in the overall as well as domain level of knowledge in children. The second objective was to examine if children can be change agents in enhancing the hypertension knowledge level and clinical adherence, and thereby lower blood pressure in the adult hypertensive in the family. The third objective was to assess if children's agency is a function of their age in hypertension management of their hypertensive adult family member. The fourth objective was related to identifying the psychosocial factors contributing to children's agency for enhanced adherence among adults. Towards these objectives, a series of univariate and multivariate analyses were taken up using SPSS v.23 and AMOS v.24. The results are discussed in details in the following paragraphs.

Objective 1: Change in children's hypertension knowledge after the intervention

Children were given intervention module of hypertensive knowledge, care, and prevention. As per the first objective it was required to determine whether the intervention module provided to children had resulted in significant improvement in their level of knowledge on the whole and in its different domains which will be evident by comparing the knowledge state prior to and post the intervention. Towards this objective paired *t*-test was processed. The results are shown in Table 4.1.

Table 4.1

Results showing Mean (*M*), standard deviation (*SD*) and *t* values of hypertension knowledge and its subscales among children participants(*n*=181)

Outcome	Pre- Intervention		Post Intervention		95% CI for Mean Difference		<i>t</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	Lower	Upper		
Hypertension knowledge (Total)	8.30	3.07	13.98	2.27	6.07	0.89	28.58***	2.10
i. General awareness	2.62	1.28	3.72	1.07	1.29	1.58	11.08***	0.93
ii. Lifestyle	1.85	1.06	3.60	1.06	1.92	0.22	20.16***	1.65
iii. Causes, Care, Casualty Awareness	1.83	1.03	2.24	1.04	0.61	2.18	4.18***	0.40
iv. Medical Management	2.02	1.17	4.40	1.18	2.6	5.28	23.85***	2.03

Note. *** $p < 0.001$; *CI* = Confidence interval

The results reveal that scores of post intervention hypertension knowledge are significantly higher than the pre-test scores. This increase is observed in the total score ($t = 28.58$; $p < 0.000$) and across all the dimensions of hypertension knowledge, i.e., general awareness ($t = 11.08$; $p = 0.000$), lifestyle ($t = 20.16$; $p < 0.000$), causes, care, and casualty ($t = 4.18$; $p < 0.000$), medical management ($t = 23.85$; $p < 0.000$). The means of pre and post intervention scores of children's knowledge can be observed under *M*, *SD*, along with the 95% confidence interval range mentioned under *Lower* and *Upper 95% CI*.

Since the results of *t* test significant, Cohen's *d* was also computed to understand the effect size of the differential score. Cohen's *d* for total hypertension knowledge shows that the change can be classified as a very large difference (higher than 2 standard deviations). Similarly, for general awareness about hypertension it can be said that the strength of the change is large (close to 1 standard deviation), for knowledge about lifestyle suited for

hypertension it is indicated that the change is very large (higher than 1 standard deviation); for causes, care and casualty related to hypertension the change observed is medium, and for medical management for hypertension the change again is very large (higher than 2 standard deviations). The results clearly indicate that there is significant change in knowledge levels after the exposure to the intervention. This indicates that the intervention was successful in improving the knowledge levels in specific dimensions as well as the overall knowledge related to hypertension.

Objective 2: Impact of children's exposure to hypertension knowledge intervention on the knowledge level, hypertension compliance, and mean arterial pressure of hypertensive adult family members

The second objective of the study was to assess the changes in the hypertensive adults' hypertension knowledge levels, hypertension compliance, and the mean arterial pressure, post children's exposure to the hypertension intervention module. Though the adults were not directly exposed to the hypertension intervention module and that the children were not specifically instructed to transfer the new knowledge to the hypertensive family member, it was expected that children would inadvertently transfer hypertension related information to the adult. In case this happened, there should be a difference in the knowledge level of adults between the baseline scores and after the children received the intervention. In order to examine this latent dissipation of hypertension knowledge, a paired *t*-test for adults' hypertension knowledge in totality and its dimensions were computed. Results are presented in Table 4.2.

Table 4.2

Results showing Mean (M), standard deviation (SD) and *t* values of hypertension knowledge and its subscales among adult participants (*n*=181)

Outcome	Before Intervention was provided to the children		After Intervention was provided to the children		95% CI for Mean Difference		<i>t</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	Lower	Upper		
Hypertension knowledge (Total)	10.61	3.07	10.90	3.10	-.54	-.04	2.29*	0.09
i. General awareness	2.81	1.07	2.99	1.14	-.33	-.04	2.52*	0.16
ii. Lifestyle	2.56	1.16	2.61	1.15	-.16	.07	0.76	
iii. Causes, Care, Casualty Awareness	2.59	1.22	2.59	1.16	-.10	.11	0.11	
iv. Medical Management	2.65	1.20	2.72	1.20	-.14	.002	1.91	

Note. **p*<.05; CI = Confidence interval

The results of paired *t*-test for hypertensive adult's knowledge test as presented in Table 4.2 indicates a significant change in the adults' overall hypertension knowledge scores (*t*=2.29, *p*=0.05) and its dimension of hypertension related general awareness (*t*= 2.52, *p*=0.05) pre and post children's exposure to intervention module. The changes in the pre and post intervention in other domains of this test (lifestyle; causes, care and casualty; and medical management) were not significant.

In line with the chief goal of this study i.e., to bring about a significant positive change in the compliance levels of the individual, and consequently in their blood pressure readings, these changes were also examined through paired *t* tests. The summary of paired *t*-test scores showing comparison of adult scores in hypertension compliance and its domains (Table 4.3), and comparison of mean arterial pressure (Table 4.4) recorded prior and post the intervention to children is provided below.

Table 4.3

Results showing Mean (*M*), standard deviation (*SD*) and *t* values (*t*) of hypertension compliance and its subscales among adult participants(*n*=181)

Outcome	Before Intervention was provided to the children		After Intervention was provided to the children		95% CI for Mean Difference		<i>t</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	Lower	Upper		
Hypertension Compliance	35.48	7.06	36.73	6.33	-1.94	-.58	3.66***	0.19
i. Medication compliance	16.29	4.74	16.72	4.35	-.79	-.07	2.35*	0.19
ii. Dietary Compliance	7.51	2.18	7.77	1.68	-.52	.01	1.87	
iii. Exercise compliance	7.62	2.32	7.9	1.97	-.61	.07	1.57	
iv. Lifestyle and self-monitoring	4.04	1.67	4.35	1.88	-.55	-.05	2.40*	0.17

Note. *** $p < 0.001$, * $p < .05$; CI = Confidence interval

As presented in Table 4.3, the hypertensive adult family members of the children showed significant positive change in their overall compliance level ($t=3.65$; $p < 0.001$). Specific change was observed in their medication compliance ($t=2.35$; $p < 0.05$) and in the lifestyle and self-monitoring dimension ($t=2.40$; $p < 0.05$). The changes in the domains of exercise and diet were not significant. This suggests that the transfer of knowledge was prominent in two dimensions namely medication and lifestyle and self-monitoring, but the intervention provided to the children did not make significant impact in their compliance with diet and exercise.

A change in the compliance level is expected to bring a concomitant change in the Blood pressure (BP). In order to examine this, a paired *t* test was computed to find the difference between MAP of hypertensive adults before and after children's exposure to intervention module. Table 4.4 presents the results of paired *t* test.

Table 4.4

Results showing Mean (*M*), standard deviation (*SD*) and *t* values of mean arterial pressure of adult participants(*n*=181)

Outcome	Before Intervention was provided to the children		After Intervention was provided to the children		95% CI for Mean Difference		<i>t</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	Lower	Upper		
Mean Arterial Pressure	116.89	5.12	110.38	6.01	5.76	7.26	17.10***	1.17

Note. *** $p < 0.001$; CI = Confidence interval

It is observed from the table that the adults showed a significant change between the tests done prior and post intervention to children ($t=17.10$; $p < 0.001$). It requires to be highlighted that the mean drop in BP was found to be more than 6 points in the post intervention scenario.

Overall, tables 4.2, 4.3, 4.4 reveal that following children's exposure to hypertension knowledge intervention, there was also a subsequent change in overall hypertension knowledge and two of its dimensions, overall compliance and two dimensions, and the mean arterial pressure of the hypertensive adults.

Objective 3: Function of age in children's agency

The literature review had suggested that developmental age may play a role in children's capacity of comprehension. Thus, the third objective of the study was to observe if children's age would have an impact on the outcomes of this study, i.e., their own hypertension knowledge, adults' hypertension knowledge, adults' hypertension compliance, and adults' mean arterial pressure. In this regard, the classes of children were taken as a fair representation of their age group, and thus their classes (Class 6, Class 7, Class 8, Class 9) were treated as independent variable and it was examined if there are significant differences in children's

knowledge, adult's knowledge, adult's adherence and their BP readings across the classes children belonged. To achieve this, Analysis of Covariance (ANCOVA) was carried out with a logical follow up by post hoc tests of multiple group comparisons based on Bonferroni's adjustment to compare the post intervention scores of the dependent variables of each group with every other group based upon estimated marginal means whenever it was required. The pre-test scores of the dependent variables were treated as a covariate in order to control their effect on the post intervention scores, thus singling out the effect of the children's class on the knowledge levels of children and adults, adults' hypertension compliance and mean arterial pressure. To pursue ANCOVA analysis, it was ensured that criteria of normality, Levene's equality of variances, and other major assumptions prerequisite to ANCOVA were met. Five separate ANCOVAs were computed, one for the overall knowledge and the other four for the four dimensions of hypertension knowledge to find the differences in knowledge levels of children belonging to the four classes between pre and post intervention.

Class Differences on Children's Hypertension Knowledge Following Intervention

It was attempted to observe the differential impact of children's classes in creating a cognitive base that was sustained over 6 weeks. To observe this, the four classes to which children belonged were compared by applying five separate ANCOVAs for differences in their hypertension knowledge retention overall and its dimensions. The results of the five different ANCOVA to compare Class 6, Class 7, Class 8, and Class 9 on the children's hypertension knowledge and its dimensions are summarized in Table 4.5.

Table 4.5

Results of one-way ANCOVA with estimated marginal means, standard errors, effect size (η^2) for children's post intervention hypertension knowledge and its dimensions

Classes →	6		7		8		9		<i>F</i> (3,177)	η^2
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>		
Hypertension Knowledge Total	14.26	0.23	13.57	0.26	14.08	0.28	13.75	0.64	1.39	
General Awareness	3.64	0.12	3.54	0.13	4.06	0.14	3.62	.33	2.65	
Lifestyle and monitoring aspects	3.76	0.10	3.28	0.12	3.65	0.13	3.96	.29	3.90**	0.06
Causes, Care, and casualty	2.09	0.12	2.48	0.14	2.19	0.15	2.30	.34	1.51	
Medication management	4.73	0.13	4.16	.15	4.28	0.16	3.97	.36	3.71**	0.06

*Note:*1. Covariate was evaluated at pre-test controlled mean value of 8.30 (Hypertension Knowledge total), 2.62 (General awareness), 1.85 (Lifestyle and monitoring), 1.83 (Causes, Care, and Casualty), 2.02 (Medication management)

2. $p^{**} < 0.01$

The adjusted means of post intervention hypertension knowledge scores (overall and dimension wise) after controlling the pre-intervention knowledge scores, Standard Errors, *F* values, and effect sizes can be observed in Table 4.5. It is observed that children belonging to different classes differed significantly in the knowledge dimension of Lifestyle and Monitoring, $F(3,177) = 3.90$, $p < 0.01$, and medication management knowledge dimension $F(3,177) = 3.71$, $p < 0.01$ dimensions of hypertension knowledge post intervention. The effect sizes for lifestyle and monitoring ($\eta^2 = 0.06$) and medication management ($\eta^2 = 0.06$) are observed to be small and about 6% of the variance in these dimensions of hypertension knowledge is due to the difference in classes when controlling for pre-test scores of the same. There were no significant differences of classes of children on the post intervention knowledge

scores of hypertension knowledge and its domains of General Awareness and Causes, Care and Casualty.

To understand which classes are different in their post hypertension knowledge, Bonferroni's multiple group comparisons are presented in Table 4.6.

Table 4.6

Results of Bonferroni multiple group comparisons on significant dimensions of children's hypertension knowledge

Multiple group comparison	Lifestyle and monitoring	Medication management
6~7	0.48*	0.57*
6~8	-0.11	0.45
6~9	-0.20	0.76
7~8	-0.37	-0.12
7~9	-0.68	0.20
8~9	-0.31	-0.31

Note: *. The mean difference is significant at .05

It is observed that there is significant mean difference of scores of Classes 6 and 7 in the dimension of lifestyle and monitoring as well as medication management. A scrutiny of Table 4.5 in this regard reveals that children of Class 6 had slightly higher knowledge about lifestyle and monitoring of hypertension ($M= 3.76$, $SE=.10$) compared to Class 7 ($M= 3.28$, $SE=.12$). In the case of knowledge of medication management too Class 6 ($M=4.73$, $SE=0.13$) has slightly higher knowledge about medication management of hypertension post intervention, as compared to Class 7 ($M=4.16$, $SE=0.15$). The mean differences in scores for all other classes were not significant.

Impact of Children's Class Differences on Adults' Hypertension Knowledge Following Intervention to Children

Similar to the preceding section, an attempt was made to find out if children belonging to different classes made a difference in influencing their hypertensive adult family members' knowledge level on hypertension following their exposure to intervention module. In order to examine this, individual one-way ANCOVAs were carried out followed with Bonferroni

Multiple Group Comparison tests. With the intention of controlling the effect of pre-intervention scores on the post intervention scores, the pre-test scores were considered as a covariate in the respective ANCOVA. The results are presented in Table 4.7 below.

Table 4.7

Results of one-way ANCOVA with estimated marginal means, standard errors, effect size (η^2) for adult's post intervention hypertension knowledge and its dimensions

Classes →	6		7		8		9		F (3,177)	η^2
	M	SE	M	SE	M	SE	M	SE		
Hypertension Knowledge Total	10.81	.20	11.13	.23	10.77	.24	10.89	.55	0.51	
General Awareness	3.08	.11	2.96	.13	2.91	.13	2.9	.30	0.37	
Lifestyle and monitoring aspects	2.43	0.09	2.92	.10	2.55	.10	2.45	.24	5.16**	.08
Causes, Care, and casualty	2.62	.08	2.52	.09	2.60	.10	2.65	.22	0.87	
Medication management	2.65	.06	2.81	.06	2.69	.07	2.86	.15	1.60	

Note. 1. Covariates appearing in the model are evaluated at the following pre-test values: General awareness = 2.81, Lifestyle and self-monitoring = 2.56, Causes, Care, and casualty = 2.59, Medication management = 2.65.

2. $p^{**} < 0.01$

Table 4.7 presents the adjusted means of post intervention hypertension knowledge scores of adult participants of the study (overall and for each dimension) after controlling the pre-intervention knowledge scores, along with the Standard Errors, F values, and effect sizes. Results revealed a significant difference in knowledge on the dimension of Lifestyle and Monitoring of adult hypertensive family members of children belonging to different classes $F(3,177) = 5.16$, $p < 0.01$, was found. The effect sizes for this dimension of hypertension knowledge ($\eta^2 = 0.08$) are observed to be small. The effect size suggests that about 8% of the variance in knowledge about lifestyle and monitoring in hypertension when controlling for pre-test scores of the same is because of the difference in the children's classes. No significant differences were observed in other dimensions.

To help distinguish the classes by their comparable differences on the lifestyle and monitoring knowledge related to hypertension, Table 4.8 is presented which consists of Bonferroni's multiple group comparisons. It is observed here that there is a significant mean difference score of lifestyle and monitoring aspect of hypertension knowledge of adult family members of children belonging to Class 6 and Class 7 only. Going back to Table 4.7, it is seen that the associated adults of children of Class 7 ($M= 2.92$, $SE=.10$) had superior understanding of lifestyle and monitoring dimension of hypertension knowledge as compared with children belonging to Class 6 ($M= 2.43$, $SE=.09$).

Table 4.8

Results of Bonferroni multiple group comparisons on significant dimensions of adult's hypertension knowledge

Multiple group comparison	Lifestyle and self-monitoring aspects
6~7	-.49*
6~8	-.13
6~9	-.03
7~8	.37
7~9	.47
8~9	.10

Note: *. The mean difference is significant at the .05 level.

Differential impact of children's classes on adult's hypertension compliance and MAP post intervention

The ANCOVAs computed for this sub-objective were found to have no differential impact upon adult's hypertension compliance and MAP post intervention.

Objective 4: Establishing children's agency towards hypertension management of their hypertensive adult family members

So far, the efficacy of the intervention module was confirmed by reporting the results of the paired t tests which confirmed differences in outcomes of children's hypertension knowledge levels (overall and specific dimensions), adults' hypertension knowledge levels (overall and specific dimensions), adults' hypertension compliance (overall and specific

dimensions), and their mean arterial pressure. Further, the differential impact of children's age was also reported and was found to be significant in the case of direct knowledge exposure, adults' latent knowledge exposure but not in their compliance levels or mean arterial pressure.

It brings us to the fourth objective of this study, i.e., to identify the predictors of children's agency that contributed towards hypertension management of their hypertensive adult family members. This investigation requires a thorough reporting of the aid used in the hypertension intervention module—the hypertension monitoring booklet. Alongside, the mutuality of the children and the associated adults was also examined by generating indices that indicate the quality of interpersonal relationship perceived by both parties. Both these indices are fundamental to arrive at final objective of the study which was to explore the innate characteristics of children in relation to the outcomes of the study. To pursue this, a statistical tool, the structural equation modelling (SEM) was used to logically conclude by identifying the predictors and scientifically exploring the pathways of children's agency in their goal achievement. The results are systematically threaded in the following sections.

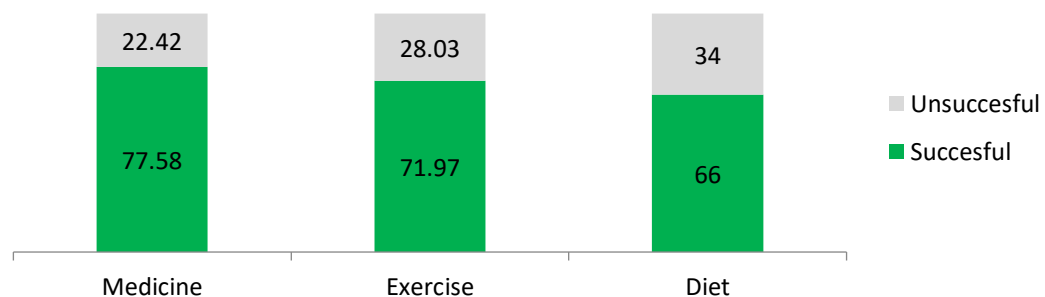
Children's agency: Evidence of Behavioural Activation

It is to be essentially noted that the reduced hypertension level of the adults was not simply a by-product of latent knowledge transfer but was primarily contingent upon the active efforts made by children in maintaining hypertension management record booklets provided to them by the investigator. The children maintained a record in which they reported whether they monitored their adult hypertensive on three vital aspects viz. taking medicine, doing exercise, and complying to the prescribed diet. A graphic representation of monitoring efforts classified as successful (for monitoring) and unsuccessful (for failure to monitor) was calculated. This was done by computing the percentage of compliance specific to each parameter. The mean percentage was calculated by obtaining the frequency of their successful and unsuccessful

efforts over 42 days of monitoring. This is illustrated in Figure 4.1. Whenever the child observed/instructed and monitored the hypertensive adult family member, thus ensuring better compliance, was denoted by the percentage computed under ‘Successful’ in the graph. ‘Unsuccessful’ is a quantified indication of the absence of effort on part of the child for whichever reason. The graph in the figure tells us that children were successful in monitoring medication compliance 77.58% of the times; compliance with exercise 71.97% of the times, and dietary compliance 66% of the times. Conversely, their failure to monitor compliance to medication, exercise, and diet was also accounted as 22.42%, 28.03% and 34% of the times respectively.

Figure 4.1

Hypertension monitoring record observed by the children for 6 weeks



Note. Bar graph representation of percentage of successful and unsuccessful reminders of hypertension management record booklet documented by children for parameters of medicine, exercise, and diet

This data is the primary evidence of children’s active role in agentic influence of their adult counterparts to comply with the three major parameters of hypertension management. The percentage also infers that these children were able to create an impact on adherence to medicine more than adherence to exercise and diet.

Perceived interpersonal relationship between hypertensive adult and child: The mutuality index

The ability to influence another individual, especially another family member is contingent on the quality of interpersonal relationship the two people share. To this effect a

questionnaire was developed to measure various aspects of interpersonal relationship centring on the child's ability to get what he/she wants through demand or influence. The questionnaire was filled by both children and the hypertensive adult family members. A mutuality index was obtained in the following 2 steps:

a. An average of the scores of the child and adult for each item was computed. For example, for Item 1 the child responds with a 4 (*almost always*), and in the parallel form the adult responds with a 3 (*sometimes*), an average of the items is obtained, i.e. 3.5. This item wise average score was done for all the 31 items of the scale.

b. A grand average of the item-wise mean scores (mutual score) was then computed to obtain an index which was inferred as the mutuality of influence perceived by both adult and child.

The mutuality indices were found to range between 1.93 to 2.50, where a higher index indicated higher perception of influenceability by both child and adult. The mutuality indices are appended (Appendix E).

Tracking the Pathway Between the Psychological Factors of Children and Hypertension Management of Adults

In order to build a comprehensive pathway and achieve the final objective of this study, structural equation modelling (SEM) was employed using IBM AMOS v 24. SEM is a statistical technique which uses a combination of techniques that is based on general linear model used for analysing causal relationships using quantitative data and theoretical assumptions. There are two steps for conducting SEM proposed by Anderson and Gerbing (1988). One, the measurement model must be tested to analyse the interrelationships of the latent factors and indicators through Confirmatory Factor Analysis (CFA). Second, path analysis of the hypothesized structural model must be conducted to observe the relationship between all examined constructs. This analysis followed the standard protocol of model

confirmation, model discrimination, parameter estimation, testing for model fit, and model reconfirmation. Empirically supported guidelines with acceptable values have been proposed by few researchers. Hu and Bentler (1999) have proposed the acceptable model fitness limits such as for SRMR (standardized root mean squared residual) values that should be close to .08 or below. Few other indices of overall fitness are assessed by indicators such as chi square (χ^2), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI) and root mean square error of approximation (RMSEA). GFI values over 0.9 and AGFI values over 0.8 indicate good data-fitting (Hu and Bentler, 1999). Browne and Cudeck (1992) suggest that an RMSEA of 0.05 or less is good, 0.05–0.08 is acceptable, and 0.10 or over is bad; CFI/Tucker-Lewis's index values should be close to .95 or above. When these thresholds are sufficiently met with, it eliminates the need for further justification for model fitness. Sometimes, even a slightly lesser fitting model may be justified if the researcher feels so, and if proper defence is provided.

The steps followed to reach an acceptable structural model have been delineated below.

1. Measurement Model

The measurement model is a part of the SEM that analyses the relationship between measures and their latent structures. This is done using CFA. When the indicators for each latent variable is not specified previously or is unavailable in theory, EFA (exploratory factor analysis) is performed to extract the underlying latent constructs for CFA (Browne & Cudeck, 1992; Tucker & MacCallum, 1997). In the present study, an EFA preceded CFA to gauge the underlying structure of the various psychological characteristics of children (achievement motivation, self-efficacy, frustration non reward response, grit, and Big 5 personality factors) represented through item parcels (Refer 1.1 below). After confirming the EFA proposed factor structure, a second order CFA or a 'pooled' CFA was also run to condense

the variables to a single representative variable namely ‘Psychological characteristics of children’.

1.1 Item Parcelling

Item parcelling refers to using the aggregate of individual items into one or more ‘parcels’ as the indicator of the latent construct (Matsunaga, 2008). When the composite scores of all items of a given scale are aggregated together in a parcel and is used as a sole indicator of the construct, the method is called an *all-item-parcel* approach. The use of this approach is parsimonious (Plummer, 2000) from a psychometric perspective in order to alleviate problems typically associated with presence of individual items such as to improve normality of indicators, stabilize multicollinearity, reduction in number of parameters as well as improve their internal consistency. From the perspective of modelling, too, it has been seen that parcelling provides better fit indices and estimates of parameters. However, there are important assumptions to be met that precede its usage: 1) indicators should follow univariate and multivariate normality with moderate considerations of violations; 2) items used to form should be unidimensional. There are certain cons also associated with item parcelling such as the dangers of hidden correlated errors and obtaining mis-specified factor model. Rushton, Brainerd, and Pressley (1983) have advocated the pitfalls and have reinforced that the use of individual items over aggregate scores.

The scale or subscale totals used in this study are of standardized tools and therefore defensibly, can be suggested as unidimensional. The total score of the scales have been undertaken to resolve the issue of parsimony because of the large number of items of each scale (e.g., 32 items in the Achievement Motivation Inventory). Hence, a total of 9 item parcels for each of the scales was considered for further SEM analysis.

1.2 Exploratory factor analysis (EFA)

EFA was computed for the variety of psychological factors assessed in children that could be potential contributors in their agency towards the management of the hypertensive adults. The goal was to obtain interpretable factors reproducing some latent construct. The classical model advocates that all error is random and thus necessitates Principal Components Analysis (PCA), whereas the neoclassical models assume random error and reduce variance explained. PCA accounts for the original set of items linearly into a set of fewer components that were “real” rather than hypothetical (Kim & Mueller, 1978; Nunnally, 1978). The decision of choosing an extraction method is based upon one’s theoretical expectations. Often the solutions are rotated to allow an easier interpretation. In this study, Promax rotation was used.

For this study, to ensure a simple and interpretable model a principal components analysis was conducted along with Promax rotation (an oblique rotation method which allows factors to be correlated). There were 9 scores used to measure various psychological characteristics of children (self-efficacy, grit, frustration non reward response, achievement motivation, and Big Five personality factors, i.e., openness to experience/intellect, conscientiousness, extraversion, agreeableness, emotional stability). The total scores of these items were considered through the all-item parcelling approach explained in the earlier section. The ‘factorability’ of all the 9 item parcels was observed through the below described criterion:

a) It was noted that all the parcelled indicators correlated at least 0.3 with one other indicator suggesting reasonable factorability.

b) The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was noted at 0.75 which was above the commonly recommended value of 0.6.

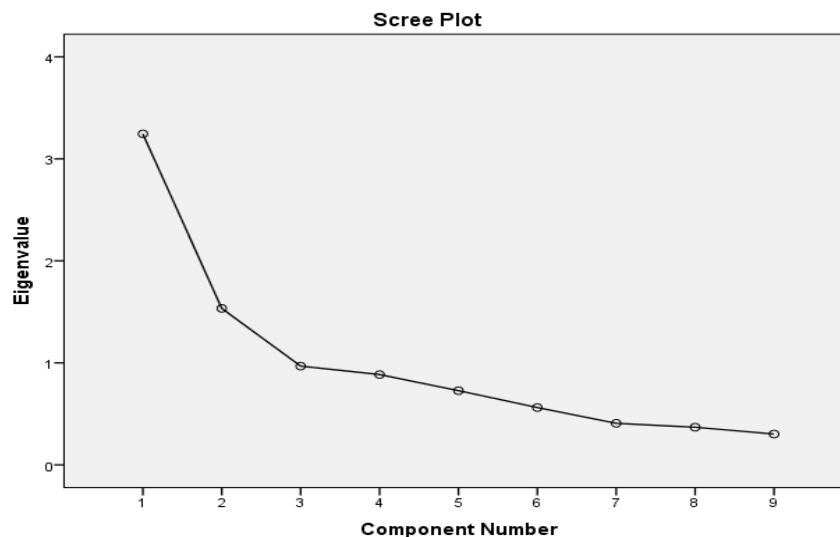
c) The Bartlett’s test of sphericity was found to be significant (χ^2 (179,36) = 446.74, $p < .001$).

d) The communalities were all above 0.3 confirming shared variance with other components.

The above confirmations deemed factor analysis suitable for the 9 item indicators—self efficacy, grit, frustration non reward response, achievement motivation, and Big Five personality factors, i.e., openness to experience/intellect, conscientiousness, extraversion, agreeableness, emotional stability. After running the EFA, a 2-factor solution was obtained. The first factor (agreeableness, openness to experience, extraversion, conscientiousness) explained 36.06 % of the variance with factor loadings ranging between 0.68 to 0.93. The second factor (frustration non reward response, grit, emotional stability, achievement motivation, and self-efficacy) explained 17.04% of the variance with factor loadings between 0.56 to 0.67. Cumulatively, the factors explained 53.10% variance. The scree plot is provided below to support these findings (Figure 4.2).

Figure 4.2

Scree plot of EFA of children's psychological factors



Note. The scree plot shows a 2-factor structure obtained from EFA of the 9 psychological factors of children

1.3 Confirmatory factor Analysis (CFA)

Based on the above, the measurement model was tested through the two extracted factors using Confirmatory Factor Analysis (CFA). CFA helps in confirming the latent variables based on the correlated variants of the dataset, i.e. through association, causal relationship, and can reduce the data dimensions, standardize the scale of multiple indicators, and account for the correlations inherent in the dataset (Byrne, 2001). A nine pooled item parcel represented using two latent factors was run using AMOS v.24. After the first run, the initial indices were not within the acceptable limit, which suggested that the apriori model had scope for improvement.

In order to improve model fitness eliminations were iterated step wise and by checking model fitness at every stage. First, the construct with the lowest factor loading was eliminated (less than 0.5). Second, the modification indices were assessed and covariances between the error terms of the same construct were drawn. Third, the standardized residual covariances which help to point out the discrepancy between proposed and estimated model were assessed and significant residual covariances (greater than 2) were used as a benchmark for removing the construct. By following these steps in iteration, 2 item parcels from the first factor (agreeableness and intellect) and 2 item parcels from the second factor (achievement motivation and emotional stability) were dropped. Finally, the value of chi square (χ^2) was reported to be 7.19, $p = 0.30$, $df = 6$, GFI = 0.99, AGFI = 0.96 and CFI = .99, RMSEA = 0.03, PCLOSE = .56. All ‘goodness of fit’ indices indicated that the model had a good fit.

The first factor was labelled “Personality” and the second factor was labelled “Tenacity”. The derived labels are explained below:

- *Personality*: Among the Big Five personality characteristics assessed in children, it was found that Intellect/Openness to experience and Conscientiousness were two prominent factors found in children of this study. Intellect or openness characterizes individuals who

are willing to engage in intellectual activities and are driven by curiosity, whereas conscientiousness refers to discipline or impulse control in order to engage in goal directed behaviour.

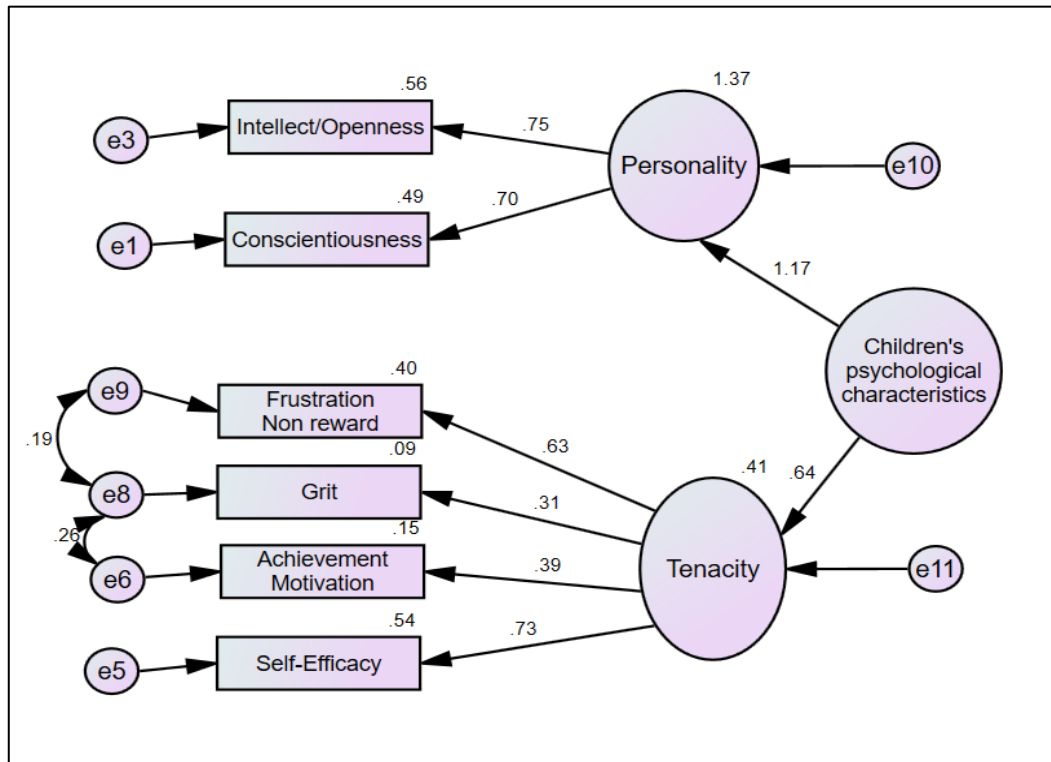
- *Tenacity*: The four factors underlying this latent variable are self-efficacy, grit, frustration non reward, and achievement motivation. Self-efficacy denotes the confidence in abilities of oneself to accomplish a task or achieve a goal. Grit refers to passion and perseverance required for task sustenance. Frustration non-reward response indicates the ability to withstand failure / obstacle in goal perusal. Achievement motivation is the personal disposition to accomplish a task. Together they indicate an individual's determination to retain passion and achieve a goal despite obstacles, hence were cumulatively termed as tenacity.

1.4 Second order CFA

A second order CFA was also conducted to unify latent constructs to obtain a single representative variable labelled as “Children’s Psychological factors”. The second order CFA was run. The model was found to have above acceptable fitness. The second order factor and its indices are provided in Figure 4.3.

Figure 4.3

Second order CFA of children's psychological factors



Note. Illustration of second order CFA to extract children's psychological factors with standardized factor loadings. $\chi^2 = 7.20$, $p = 0.30$, $df = 6$, $GFI = 0.99$, $AGFI = 0.95$, $CFI = 0.99$, $RMSEA = 0.03$.

2. Structural Model

In this phase of analysis, the structure and order of CFA is preserved and causal relationships between latent constructs are conceptualised and tested using the data. The directions of the arrows are constructed according to the developed hypothesis. One way arrow is indicated from the exogenous constructs (independent constructs) towards the endogenous or dependent constructs. Two-way arrows indicate covariances between variables that do not indicate direction. Similar to CFA, the various fit indices of the model were examined.

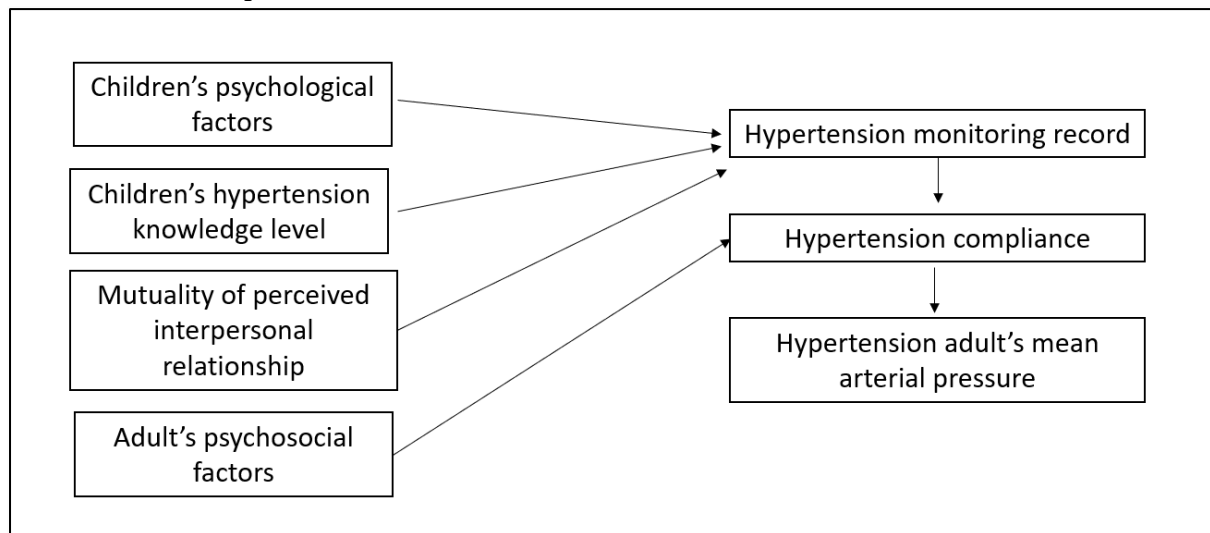
2.1 Hypothetical Model

To explore the causal process of children's agency (the contributing psychological factors, their hypertension knowledge levels, the mutuality of their perceived interpersonal relationship), along with assessed adult's psychosocial factors, through the hypertension

monitoring record, the hypertensive adult's compliance and mean arterial pressure, a hypothetical model was conceptualised. This figure is illustrated in Figure 4.4 below which was utilized in testing pathways in SEM.

Figure 4.4

Hypothetical model for depicting causal process between psychological characteristics of children's agency, the hypertension monitoring record, and hypertensive adult's compliance and mean arterial pressure



Note. The model above conceptualises that children's agency is routed through factors such as their own psychological factors, their enhanced levels of hypertension knowledge, their perceived mutuality of interpersonal relationship on their activity of the hypertension monitoring record. This behavioural activity is then hypothesized to be contingent factor of adult's self reported compliance and subsequently their mean arterial pressure. Additionally, the compliance may be dependent upon the adult's own psychosocial factors

2.2 Model confirmation

The SEM gave rise to an initial model for which the fit indices and path estimates were assessed. Model misspecifications were detected, and two indices—the standardized residuals and modification indices were used to make informed decisions about elimination of constructs or modification of the model. Standardized residual estimates inform the differences between the observed residuals and zero residuals; where zero residuals denote perfect fit (Bryne, 2010). The standardized residuals above 2.58 are specified to be a large differentiator (Hair, Black, Babin, & Anderson, 2010; Jöreskog & Sörbom, 1993). Based upon the standardized residual estimates, the construct of self-efficacy was dropped from the model. Based on the

modification indices, theoretically sound covariances among residual errors were drawn. A path between mutual interpersonal relationship, children's hypertension knowledge, and adults' psychosocial factors (Type A/ Type D personality) was drawn. Based on non-significant path estimates and to improve the model fitness further, more constructs were dropped such as children's hypertension knowledge, adult's psychosocial factors (Type A/ Type D personality). The final model is provided in the Figure 4.5. The modified model's parameters were estimated and the indices indicated good model fitness and data fitting with the framework. The value of chi square (χ^2) was found to be 84.67 ($df = 67$; $p=.071$). The other indices were—GFI=0.940, AGFI=.905, CFI=.965, and RMSEA=.038, PCLOSE=.78—which met with ideal cut-offs specified in literature. Hence, this model was accepted.

The standard path coefficients for the major pathways were analysed. These contributions are derived from the standardized regression coefficients of the paths. The contributions of children's psychological factors on the hypertension monitoring record were found to be 0.70 ($p<0.01$). The hypertension monitoring records observed by children was found to have a contributing effect of 0.67 ($p=0.006$) towards hypertension compliance. A direct contribution of perceived mutual interpersonal relationship on hypertension compliance of hypertensive adults was also observed of 0.48 ($p=0.023$). Ultimately, hypertension compliance contributes by -0.35 ($p=0.02$) on mean arterial pressure. The negative sign bears indication that as compliance increased, there was a drop in the mean arterial pressure. In terms of regression estimates, there is a 12% difference in mean arterial pressure due to better compliance triggered by the monitoring activity by children.

Structural Equation Model of children's agency in hypertension management of their hypertensive adult family members



Chapter V

DISCUSSION

CHAPTER V

Discussion

The goal of the study was to examine children's agency in enhancing hypertension management of their adult hypertensive family member. Having explored the premise of the study objectively through statistical analyses, the hypotheses framed for investigation, along with the key findings, the limitations, future directions, and implication of the research are discussed in a systematic progression in this chapter.

Hypothesis 1: The module for hypertension management intervention provided to children will enhance hypertension knowledge levels in them

The first objective of this study was formulated to build children's agency by empowering them with knowledge capital through hypertension knowledge intervention. The hypothesis conjectured that the exposures of hypertension intervention would enhance children's hypertension related knowledge. For this purpose, the hypertension knowledge scores, post intervention exposure, was compared with their baseline scores. This hypothesis is accepted in the light of increased scores in all dimensions of hypertension knowledge test responded by the children post the intervention module exposure.

An extensive and strong knowledge base was established through the intervention module primarily enriching the hypertension related cognizance of children in terms of its four major domains—general awareness about hypertension; the lifestyle factors related to hypertension; the causes, care, and casualty related to hypertension; and the medical management of hypertension. Building and assuring a rich cognitive foundation was particularly important as it helped the children to appraise the threat of the disease and simultaneously also equipped them with proficient coping mechanisms to be able to manage its ill effects. The confidence that children would be able to comprehend the gravity of the disease was corroborated through evidence found in a study by Hariharan, Andrew,

Kallevaram, Rao, and Chivukula (2018) where children of a similar age group had the ability to comprehend hypertension from a multi-dimensional point of view. The threat of the disease is expected to be internalized and evoke an emotion of protection towards the family member. This proposition finds support in the protection motivation theory by Rogers (1975). The pathways of threat and coping appraisal through cognitive mediation is expected to urge a 'protection motivation' mechanism, initiating health promotive behaviour or inhibiting any health risk, converting intentions into actions (Hariharan, 2020). Although the argument of this theory is in regard to the individual contemplating the change in health behaviour, the motivational orientation is also expected to build up in children through realisation of the gravity of the disease coupled with well-rounded hypertension related information extending their care into practice by monitoring their hypertensive family member. Psycho-educating the children about hypertension and its management aimed to stir up intrinsic motivation in them by means of orienting their own responsibility and affection towards the duress of hypertension in their family members. The conceptualization of pathways of intrinsic motivation, extrinsic motivation and the basic psychological need fulfilment through relatedness is reinforced by the principles of self-determination theories by Deci and Ryan (1985) such as cognitive evaluation theory (CET), organismic integration theory (OIT) and relationship motivation theory (RMT). The thrust of these theories is crafted here based upon their core principles. Another aspect advocated by the RMT is 'familism'. It is a quality that encourages ascendance of family orientation over personal interests. In this case, implementing the learned content through regular monitoring exercise of hypertension compliance in their family members was routed through the emotional inclination towards their family members.

Group learning through repeated discussion of the intervention module over 4 weeks also brought into effect social norms and value to the psychoeducational activity. The duration and repetition (three times with a gap of one week and then after a fortnight for the third time)

of the intervention module was done to reinforce the knowledge base and clarify any doubts. Pearson et al (2007) have claimed that any behavioural intervention for a period of 6 weeks is likely to persist as a behavioural change even after 12 months post intervention. Learnt facts at school are also accepted more readily without requiring any external agent for supervision (Bowen et al., 2007; Clanton Harpine, 2008; Greenberg et al., 2003). Moreover, this information also serves as a primary prevention strategy for children. Hard facts about hypertension and hands on experience as a caregiver would help children develop a health conscious leaning towards desired health behaviour. This is particularly relevant to combat the upsurge in hypertension and cardiovascular risk factors being observed in Indian children from a very early age (Chakraborty, Dey, Pal, Kar, Zaman, & Pal, 2011; Genovesi et al., 2011; Raj & Krishnakumar, 2013; Rao & Apte, 2009; Sharma, Grover, Kaushik, Bhardwaj, & Sankhyan, 2010) warranting its seep into adulthood.

Hypothesis 2: Exposures of hypertension management intervention module provided to the children will enhance hypertension knowledge levels in their hypertensive adult family members, their compliance levels, and their blood pressure levels.

The second objective of the investigation was to evaluate the effect of the hypertension intervention module provided to the children via an anticipated latent change in hypertension knowledge, hypertension compliance, and blood pressure levels of their hypertensive adult family member indicating an improved hypertension management in them. Though the adults were not directly exposed to the hypertension intervention module, it was expected that children would inadvertently transfer hypertension related information to their family members. In case this happened, there should be a difference in the knowledge level of adults before and after the children were exposed to the module. This metamorphosis in cognition levels along with continuous monitoring was assumed to trigger the desired hypertension self-care in the adults which eventually would result in lowered BP levels. Therefore, this objective

was explored via three sub-hypotheses: i) Children's exposures of hypertension management will enhance the hypertensive adult family members' hypertension knowledge level, ii) Children's exposures of hypertension management will enhance the hypertensive adult family member's hypertension compliance level, iii) Children's exposures of hypertension management will lower the hypertensive adult family member's mean arterial pressure indicating an effective management of hypertension.

The results revealed that there was an increase in overall hypertension knowledge and specifically in the domain of general awareness among the hypertensive adults. Hence the first sub-hypothesis is deemed accepted. Previous studies have acknowledged children as key communicators and persuaders through active information dissipation within their network (Christensen, 2004; Primdore, 2003). The unintended knowledge dissipation also taps onto the potential of children as caregivers. It is generally known that health education information flows from adults to children. However, the direct influence of children on the values, attitudes and knowledge of their family members have been increasingly documented over the past years (Damerell, Howe, & Milner-Gulland, 2013; Evans, Clark, Levinson, Levin, & Mellins, 2001; Vaughan, Gack, Solorazano, & Ray, 2003; Vierra & Garrett, 2008). Specifically related to hypertension knowledge, children have been intermediary intergenerational messengers that has been recorded in various studies (Fors, Owen, Hall, McLaughlin, & Levinson, 1989; Lwin, Malik, Chua, Chee, & Tan, 2016; Viera & Garrett, 2008). In this study, the major transfer of information took place in a general context possibly because children were not specifically instructed to share their knowledge but were rather focussed on encouraging the compliance in the hypertensive adult. The inadvertent flow of information suggests that communication was facilitated through the perceived mutuality of interpersonal bonds or in an attempt to convince the adult member on compliance. Children are likely to be successful in convincing the adults provided their communication skills are good, they use logical arguments and more importantly

if their interpersonal relationship is strong with the adult member. This perceived influence was measured and reported by the mutual interpersonal index. The range of indices strongly suggested that children were found to have a high capability to influence the hypertensive adult.

The second sub-hypothesis conjectured that the exposures of hypertension management intervention provided to the children will improve their hypertensive adult family member's hypertension compliance levels. It was observed that there was an overall improvement in the hypertension compliance of adults specifically in the domains of medication, lifestyle and self-monitoring. Hence this sub-hypothesis was deemed accepted. Hypertension is a lifestyle disease that is contingent upon pharmacological and non-pharmacological adaptations concerted by the patient. A lack of knowledge about the disease and disease management per se is often an obstacle in hypertension compliance. With a change in cognition, it was assumed that there will be a change in compliance corroborated in several studies encapsulating Knowledge, Attitude, and Practice (KAP) about hypertension and the positive potential of BP education programs (Chijioke, Anakwue, Okolo et al., 2015; Mahajan, Kazi, Sharma, & Velhal, 2012). This is only one pathway of the change implementation, i.e., through the hypertensive patients themselves. The other paths need to be explored. Indian culture being affiliation oriented, and the effectiveness of family support having proved in past research, a new dimension of family support has been focused in designing the intervention module by assigning a significant role to children. Here it is critical to glue together the relevance of the children's active monitoring efforts at this juncture reflected in the daily hypertension monitoring record maintained by children. The data of the hypertension record aimed to account for the frequency and success rate of the children's efforts to be able to interject compliance in the adults with respect to their medicine, diet, and lifestyle. This gently taps onto the factorability of social support or familial support. "Information-Motivation-Behavioural Skills Model for Health Behaviour Change" is a behavioural theory which identifies the

constructs essential to self-management in adherence behaviour of individuals with chronic illness (Deakin et al, 2005; Sabaté, & Sabaté, 2003). This targets the affective state with an active social support network for the patient. Social support from within the family invokes committed vigilance towards the lifestyle needs of the patient and can greatly elevate therapeutic compliance towards controlled BP (Ojo, Malomo, & Sogunle, 2016). At the same time, active monitoring generates a sense of affection and care that is adjunct to a stress sensitive system. A support intervention (through warm touch enhancement) among married couples found that post treatment ambulatory systolic blood pressure was significantly lower as compared to the control group (Holt-Lunstad, Birmingham & Light, 2008). Reflecting deeper into the domains of hypertension self-care, medicine compliance and lifestyle and self-monitoring compliance were significantly dominant among other changes. Validating it with the monitoring efforts of children, it was also seen that in totality, children were more successful in monitoring medication compliance compared to the parameters of exercise and diet. A study by Evangelista, Berg, and Dracup (2001) reported that even in a sample of 82 heart failure patients, compliance to treatment regimen and medicine compliance was higher as opposed to compliance with dietary and exercise regimen. Dietary and exercise adherence require additional perseverance and self-discipline to sustain the activities (Egan, Zhao, & Axon, 2010; Gao et al, 2009). This is especially relevant in the contexts of Indian households where diet plans are a collective or unanimous choice and is rarely individualised. The lack of an exercise discipline in hypertensive adults is usually because they belong to an older age bracket and could be facing orthopaedic ailments or may suffer from pain exacerbation contributing to low self-efficacy and fear of injury (Bij, Laurant, & Wensing, 2002) that are amongst a few barriers that inhibits exercise behaviour.

Arriving at the third conjoint sub-hypothesis, it was expected that parallel to enhanced compliance post intervention, there would, be a decrease in mean arterial pressure in the

hypertensive adults indicating an improvement in hypertension management. Additionally, this was proliferated through daily monitoring efforts by the children to maintain the major parameters of compliance—medicine, exercise, and diet. The results of this study, did indeed show a significant decrease in the mean arterial pressure of the hypertensive adults, post children's intervention exposure. In light of the findings, this sub-hypothesis is accepted despite discounting the barriers of exercise and diet compliance which had a modest success rate, children's monitoring can be easily correlated with adult's self-reported compliance and post intervention drop in blood pressure which highlight the efficacy of routing children's agency in this direction.

In congruence with the corresponding transformation in the adults' parameters, the data from the hypertension management record booklet provides the primary evidence that change was implemented among the hypertensive adults that helped them to manage blood pressure through better hypertension compliance. Hence, in view of results obtained, the major hypothesis is accepted which states that the hypertension knowledge intervention to children were effective in bringing about a change in the adult family member's knowledge about hypertension, their compliance level of hypertension management, and most importantly in their mean arterial pressure.

Hypothesis 3: Children's influence in hypertension management in hypertensive adult family member will be a function of their age

While planning such a focused intervention, it was of primary concern that the resource inputs should be compatible with the comprehensibility capacity of children. With this in mind, the next objective of the research investigation was to check for differences in knowledge retention among the children of classes 6, 7, 8, and 9. Their age was generalized through their classes. It is often hesitated to place new roles and responsibilities on children, although studies

have shown that children above age 9 not only dissipated the information but also maintained the behaviour themselves (Thanh Xuan, Rheinländer, Hoat, Dalsgaard, & Konradsen, 2013). It may be relevant to make a reference to the science curriculum of children in high school. Children of 7th class are already exposed to the knowledge of chronic diseases as part of their curriculum while children of 6th class were new to any information on chronic illnesses. Empirically, there were no real differences amongst the classes except for Class 6 and 7, where Class 6 showed better retention of hypertension knowledge in specific domains such as medication management and lifestyle monitoring compared to Class 7. This finding corroborates with the theories proposed by Piaget regarding intellectual comprehension (Campbell, 1975; Piaget, 1965). It is probable that children of Class 6 were acclimatising new schema through assimilation of new facts related to hypertension in terms of medication management and lifestyle monitoring. As for children of Class 7, having being already exposed to chronic illness in their school curriculum, it probably directed lesser attention to the nuances of hypertension management. Researchers (Hanfstingl, Arzenšek, Apschner, & Göilly, 2021) mainly agree that assimilation is more “theory ridden” and may distort current reality. On the other hand, accommodation is a more effortful cognitive demand to alter existing schematic information. This difference in classes may be viewed as only a matter of metaphysical time lapses and coincidence of knowledge exposure parallel to ongoing curriculum. Further, it was observed that in adults’ level of knowledge in the lifestyle and self-monitoring domain, post intervention exposure, Class 7 were better in dissipating that knowledge to the adults. It reiterates that this developmental age is close to the departure of concrete operational stage and is set at the arrival of formal operations stage in terms of intellect and reasoning. While Class 6 may have retained the knowledge better, Class 7 showed better transference through conversion of knowledge into practicable ideas. Again, when it came to studying the difference in mean arterial pressure of adults categorized by classes, there were no significant differences

amongst them. As an overview, it does not shadow the fact that knowledge retention, knowledge compliance, and the chief goal—the mean arterial pressure, had desired transaction from child to adult across the classes. Moreover, the lack of differentiation in classes signifies that age is a neutralised factor when viewed in terms of content and form of intervention module. It may also be implied that the intervention module was comprehensible by all age groups. In light of the above findings, the hypothesis that children's agency via their influence in hypertension management of their hypertensive adult family member is a function of their age, is not accepted.

Hypothesis 4: The psychological factors in children that contribute to hypertension management in adults will follow a pathway through the intervention module

Having explored the efficacy of the intervention by establishing the differences in compliance and the adults' mean arterial pressure, following the intervention exposure of children and their active indulgence in monitoring the adults, it was an obligatory objective to investigate the psychological characteristics their efficacy in hypertension management of their hypertensive family members, and track the pathway of children's agency from self to the adults. The results clearly illustrate tangible pathways of children's agency in reducing the mean arterial pressure to the desired levels. To bring more relevance to the matter the several engaged pathways need to be highlighted.

The major pathway was outlined routing from children's psychological characteristics that contributed to the hypertension monitoring record activity weighing in upon the hypertension compliance in adults and ultimately promoted reduction of mean arterial pressure. Another significant tell-tale was the mutual interpersonal bond shared between the adult and the child directly contributed in the hypertension compliance of the adult which interposed in the reduction of mean arterial pressure. The pathways established clearly emphasize the agency

of children through active engagement in monitoring for compliance and achieving the chief aim of the study, i.e., reduced blood pressure level in the adult family members. It is also imperative to mention that though knowledge levels of children (an important hypothesized variable) had significantly enhanced post intervention exposure, it was overpowered by the behavioural activity pursued by the children. While the knowledge intervention resulted in enhancing the knowledge in children as seen in paired t test, the SEM model did not show its direct contribution to children's monitoring behaviour. While SEM is a reflection of direct contribution of the factor, where the knowledge intervention was not found to contribute, one cannot rule out the indirect contribution of the knowledge intervention to children's monitoring behaviour. This is because, knowledge is assumed to get assimilated and accommodated before translating into the related behaviour. This internal process is a conceptual function that is not measured. The fact that the monitoring of children was present as a behavioural intervention, it is inferred as an offshoot of knowledge intervention. This phenomenon will be clear only with a control group design study, which is beyond the purview of the present research. It is also possible that these factors may be influential through an indirect path not explored in this study. Considering the holistic picture, and in view of the statistically proven pathway, the fourth and ultimate hypothesis that there is a pathway culminating in the effective management of hypertension. The pathway is tracked from the psychosocial characteristics of children contributing to monitoring behaviour, adults' compliance behaviour leading to reduced Blood Pressure levels is accepted.

Breaking it down further, the dominant psychological characteristics that prevailed among children were intellect/ openness to experience, and conscientiousness. These two variables have been found to be linked to academic achievement in students (Gatzka, 2021; Kommaraju & Karau, 2005). Individuals possessing 'intellect/openness to experience' are indicative of curiosity and retain propensity to cognitively explore relevant knowledge and are

less susceptible to inhibition of information. For the children in the study this was the first unique opportunity to assume responsibility for monitoring the health of an adult in the family. It also opens an avenue of role reversal for them—a position of valuable affectionate authority, as it is usually the adults taking care of the children. This is highly likely to trigger intrinsic motivation to care for the hypertensive adults. At the same time, the other dominant quality in children was found to be ‘conscientiousness’. This personality characteristic tends to make a person mindful of the dutiful obligations or the implicate desires to complete a task. Having familial affiliations with the hypertensive adult, the characteristic of conscientiousness evoked obligations towards the family member in an efficient manner. Empowering them with a serious responsibility and a definitive outcome in mind through monitoring health behaviour in the adults drove them to put their heart and soul to strive for accomplishment and not merely as an extrinsically motivated goal.

Other than their innate personality traits, tenacity was posited as a super-factor that helped maintain determination in the children. Tenacity was composed of frustration from non-reward, grit, and achievement motivation. Collectively they are reflective of the continued resolution to achieve a goal despite failures or amount of time consumed. Individually these traits are a window to the efficacy and persistence with which they monitored the hypertensive adults on a daily basis. The data obtained from each of the parameters of the hypertensive monitoring record over a period of 6 weeks show that children continued to show ‘grit’—passion to sustain long term motivation to achieve a goal. Despite a moderate number of unsuccessful attempts, children did not feel demotivated. Grit is a sign of persistence and willingness to stick to a long-term goal. The trait of ‘frustration non-reward’ or frustration tolerance is also reflective of their attempts to push forward and try new strategies to deal with times when they were not able to successfully monitor the hypertensive adult.

It may be of significance to describe the role of the investigator in promoting the intervention through children's monitoring behaviour. The investigator played an important role in positively providing directions to the children to contemplate the reasons for unsuccessful attempts and try different ways to achieve their set goal. This sort of 'force-field analysis' (Lewin, 1946) by a competent professional (here, the investigator) who could hash through the difficulties that the children were facing in effectively improving the chances of success in increasing adherent behaviour. At the same time, children were stimulated by the successes and accomplishments throughout the intervention period. This is said with conviction because of two methodological processes followed: a) the intervention sessions were conducted in groups which aroused the spirit of healthy competition, b) the investigator regularly took note of their weekly accomplishments. This is also duly reflected in the 'achievement motivation' component of tenacity. The fact that their efforts are taken cognizance of must have worked as a constant encouragement for the children to sustain their monitoring efforts. Further, the adult family member's compliance as a consequence of their monitoring also must have functioned as a positive reinforcement strengthening the children's monitoring behaviour. Children who have high achievement motivation are more likely to persist in their efforts when they see reward in some form or the other.

Another notable factor was the perceived influence of children in the interpersonal relationship shared between the adults and the children of respective families that had an impact upon the hypertension compliant behaviour of the adult. This index of mutuality is also illustrative of the possible power of influence that children have over the adults. This influence builds ground for the use of various strategies that children use to get their demands fulfilled such as bargaining, persuading, emotional contexts, request, etc (Johnson, 1976). It is a two-way street where the mutuality index also is demonstrative of the unconscious impulse of the adult to give in to the child's requests. When the mutuality of perceived relationship is high,

any resistance or barrier perceived in communication can easily be infiltrated by children. Here, the cognitive evaluation theory (Deci & Ryan, 1985) fits well in explaining the boost of intrinsically motivated children. Understanding their intrinsic motivation is an important factor that explains their greater initiative, greater perseverance, their better performance, and need for better wellbeing. This is propelled only when the goal assigned is appealing and holds value to them and is enhanced by fuelling their needs of competence (belief fostered by the investigator that they were capable of executing the task of caring for the hypertensive adult), autonomy (perceived internal causality—aspiring their own agency in bringing about hypertension management), and relatedness (the need to belong in a secure relational base, and to experience caring for others).

A direct pathway was also established between hypertension compliance of the adult and their own mean arterial pressure. So far, it was observed that this pathway is evoked by mediating pathway of the children's agency via their characteristics, their persuasion skills, and their daily monitoring practice. It all leads to the ultimate goal of this study, i.e., to enhance the level of hypertension compliance and bring down the mean arterial pressure by using children's agency after empowering them with strong knowledge base. The structural equation model established a very clear causal pathway of the direct contribution of children's influence in altering compliance and mean arterial pressure. The psychological factors in children – intellect/openness to experience, conscientiousness, frustration non-reward responsiveness, grit, and achievement motivation were instrumental in monitoring the compliance of the hypertensive adults. The hypothesis that children's psychological characteristics and their efforts in daily monitoring the major parameters of lifestyle change and reducing blood pressure in their hypertensive family member is accepted. Thus, it may be said with confidence that the psychoeducational holistic hypertension management intervention supplemented the biomedical approach and optimized hypertension care. It is established not just as an alternate

approach but an effective supplement to the biomedical care that enhances the treatment outcome that is highly cost effective.

Limitations

This quasi-experimental study does have certain natural limitations. The study is not a control group design so as to compare the knowledge, compliance and BP management of another group of adults who were given only standard care without any monitoring by the children. Secondly, the heterogeneity of the sample in terms of relationships with the hypertensive family member does not allow for the deeper understanding of the nuances of a persuasive agentic perspective of children in terms of gender dyads (mother- child, grandfather-child, etc). Further, the follow up to the intervention study was set as 6 weeks due to issues of feasibility. The claim of sustainability would definitely be enhanced if the study had the period of hypertension management been studied for a longer period of time, or re-assessed after a short span of time such as 6 months or a year. Finally, the evidence presented falls short to note the influence of other socialization agents, if any, and the presence of any resistant personality factors. It also does not imply that capability would convert into influence. It is highly recommended that these limitations be considered while designing further studies.

Implications

The diagnosis of a chronic condition like hypertension requires intensive management and demands stake holding at the individual level. Moreover, it is not entirely new that children have been involved in community interventions and could be effective in any concerning public health problem that needs a solution at a personal level. This particular study has strong positive implications that are double edged in nature. In a collectivistic family-oriented structure of India, children are the soft spot of an innovative and cost-effective paradigm shift in the biopsychosocial treatment of hypertension management. An investment into the 200 million

school going children of India could easily fill the gap of a resource poor country that falls short in an adequate doctor – patient ratio. Children, already proved to have a desirable influence on family's health related behaviour supplement the effective outcome of treatment to hypertension, along with developing a futuristic conscious about their own health. From the perspective of health economics and increasing health care burden on the medical systems of our country and worldwide, group education and training of children in hypertension management could prove to be a cost-effective measure of timely redressal of crisis through implementation in their own families. Enhancing compliance through this measure would reduce the burden on the nation arising out of adversities of the disease due to non-compliance, thereby bringing down the DALY for the country. It is also suggested that knowledge related to lifestyle diseases be implemented in school curriculums to optimise health knowledge and practice. This area of study remains under researched and motivates inquiry which would help to understand the influence of children on parents in depth. The death projections of a chronic illness have severe socioemotional impact, not only for the life of the person but for the family that suffers from a sudden loss. This is the vivid scenario of a large segment of Indian population already affected or who remain undiagnosed of hypertension. This can be taken care of by addressing it with a proactive measure of educating the next generation on lifestyle that helps in keeping hypertension at bay. The success of the study is a good feeder for policies of science education in schools with suitable project work.

Policy makers and other healthcare organizations may take cue to inculcate health education of chronic diseases at a young age as school-based programmes are an ideal setting and student friendly (Harrabi et. al, 2010) facilitating peer education as well. This study has useful insights for the development of community and national programs that can offer culture tailored informational support to children. The findings of the study also inform us of the effective management of hypertension in adults and the pathway to modify such health risk

behaviour through the influence of children. The findings of the study provide evidence that well informed children are armours to fight against diseases and warrant economic, social and personal security and wellbeing. To rise to the status of health management, health psychologists have a major role to play in facilitating adaptive health orientation and must be accommodated in the food chain of the health system to arrive at holistic solutions.

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APPENDICES

Hypertension Knowledge Test (HKT)

Name..... Class..... Age..... Gender Girl / Boy

Instructions: *This test is designed to know what you understand about hypertension and its management. Read each item below and circle the option that you think is correct. If you do not know the answer then circle the option 'Do not Know'.*

1. If someone's blood pressure is 120/80, it is
 - a. High
 - b. Low
 - c. Normal,
 - d. Pre-Hypertension
 - e. Do not know

2. Dietary changes that are useful to control hypertension
 - a. Consuming more fruits, vegetables and whole grains
 - b. Red meat, egg, milk, cheese
 - c. Confining to liquid diet.
 - d. Go on fasting intermittently
 - e. Do not know

3. For patients with high B.P, reducing salt intake.
 - a. Helps in bringing down the B.P
 - b. Increases the B.P
 - c. Does not have any impact
 - d. Is dangerous
 - e. Do not know

4. Once someone has high blood pressure, it usually lasts for
 - a. Two years
 - b. 5–10 years.
 - c. 10-15 years.
 - d. Rest of their life.
 - e. Do not know

5. People with high blood pressure should take their medicine
 - a. Every day and lifelong without break.
 - b. A course for one week.
 - c. Only when the B.P is high.
 - d. Until the B.P gives normal reading.
 - e. Do not know

6. What happens when B.P shoots up very high crossing its limits
 - a. Leads to paralysis
 - b. Leads to holes in the heart
 - c. Damages the bones
 - d. Both a & b
 - e. Do not know

7. Doctor needs to be informed about the medicines that a B.P patient is using
 - a. When undergoing surgical procedures
 - b. When going for X-Ray
 - c. When consulting doctor for uncontrolled fever
 - d. When one has severe throat infection
 - e. Do not know
8. Which of the following is not a cause of high B.P?
 - a. Obesity
 - b. Excessive anger
 - c. Smoking
 - d. Hereditary.
 - e. Do not know
9. The fact about High blood pressure is that
 - a. It is normal phenomenon in every person.
 - b. It causes serious health problems if left untreated.
 - c. It is seen only in old people
 - d. It is seen in people who are short tempered
 - e. Do not know
10. Risk of hypertension can be reduced by
 - a. Smoking occasionally
 - b. Consuming limited quantity of alcohol everyday
 - c. Avoiding physical activity
 - d. Reducing the weight
 - e. Do not know
11. Medicines for hypertension
 - a. Can be suggested by a relative who has been taking medicines for high B.P for prolonged period
 - b. Cannot deviate from the prescribed medication under any circumstance.
 - c. For any reason, if the prescribed medicine is unavailable, the medicines used by other hypertensive patients can be taken temporarily.
 - d. When one forgets to carry the medicine while going out, it can be skipped.
 - e. Do not know
12. In a patient of Hypertension, If suddenly one side of face starts drooping, speech becomes difficult, arm becomes weak then its possibly
 - a. Brain stroke
 - b. Heart attack
 - c. Heart failure
 - d. Kidney failure
 - e. Do not know
13. Commonly used drugs to treat hypertension
 - a. Beta blockers and diuretics
 - b. Diuretics and hormones
 - c. Vasodilators and steroids

- d. Sodium carbide and calcium carbonate
 - e. Do not know
14. Which one of the following is wrong
- a. Medications should be taken on time every day.
 - b. When the B.P is normal, medication can be stopped.
 - c. Take the medicine irrespective of other problems like fever or cold.
 - d. Doctor should know all the medications being taken.
 - e. Do not know
15. What should be done if a person misses a dose of medication?
- a. It is good to take skipped dose along with the next dose together
 - b. Skip the next dose also and start fresh from next day morning
 - c. Take the dose as early as possible.
 - d. It is good to skip routinely to avoid over dosage
 - e. Do not know
16. Warning signal during a heart attack
- a. Person suffers from fever & chills
 - b. Person experiences headache.
 - c. Person suffers from dizziness, pain in the chest and shortness of breath.
 - d. Person suffers from swelling of feet
 - e. Do not know
17. Which of the following is correct?
- a. Decrease medication dosage when the symptoms disappear
 - b. Medication can be skipped once in a way
 - c. Have a routine for taking medication
 - d. Increase the dosage when the symptoms are severe.
 - e. Do not know
18. Hypertension is blood pressure recording more than
- a. 100/80
 - b. 110/70
 - c. 120/80
 - d. 140/90
 - e. Do not know
19. Life style modifications for treating Hypertension include
- a. Resting a lot
 - b. Regulating diet and exercise
 - c. Living in quiet locality
 - d. Controlling anger.
 - e. Do not know
20. Which of the following statement is wrong?
- a. Eat less red meat and sweets
 - b. Eat foods that are high in magnesium, potassium, and calcium
 - c. Eat foods with more sodium
 - d. Eat more whole grain products and fish

e. Do not know

21. Damage caused by high blood pressure to body

- a. Heart attack, heart failure, brain stroke.
- b. Damage of blood vessels, eyes, kidneys.
- c. Gaining lot of weight
- d. Both A and B are true
- e. Do not know

22. All are true statements about Hypertension except

- a. Genes, obesity, stress are some of risk factors
- b. Walking long distances is harmful for patients with high B.P.
- c. Headaches, chest pain, breathing difficulty can be symptoms when B.P. is high
- d. It can sometimes be a “silent killer” with very little symptoms
- e. Do not know

SMP CIA – FORM A**APPENDIX A2**

Name of the person with high blood pressure:

Relationship with the adult:

Instructions The following statements aim to find out the relationship you have with your parent or a guardian closest to you (who lives with you). Kindly read each statement carefully and put a tick mark in an appropriate column. The blank space in the statement indicates *your mother, your father or your closest guardian*. You must identify only one relationship to respond to these statements. Each statement has four options to choose from – ‘Almost Always’, ‘Sometimes’, ‘Rarely’, ‘Never’. That means each statement asks you how frequently the situation occurs for you. Depending upon how often you do/ do not do something referred to the question, you must choose your response.

Example: I can persuade my aunt to take me for a movie.

In case you are able to successfully convince your aunt most of the times, you need to choose ‘Almost Always’. In case you are never able to convince your aunt, you need to choose Never.

1. My _____ **patiently listens to me when I have to say something**
☐Almost Always ☐Sometimes ☐Rarely ☐Never
2. I can easily convince my _____ **to buy me something I wish to eat**
☐Almost Always ☐Sometimes ☐Rarely ☐Never
3. My _____ **always gives me pocket money when I ask for it**
☐Almost Always ☐Sometimes ☐Rarely ☐Never
4. I maintain a distance from my _____
☐Almost Always ☐Sometimes ☐Rarely ☐Never
5. However much I try, my _____ **refuses to eat something he/she does not like**
☐Almost Always ☐Sometimes ☐Rarely ☐Never
6. My _____ **never shows interest when I talk about things related to my school**
☐Almost Always ☐Sometimes ☐Rarely ☐Never
7. My _____ **gives up something he/she likes to eat to pass it to me**
☐Almost Always ☐Sometimes ☐Rarely ☐Never
8. My _____ **hardly spends time with me**
☐Almost Always ☐Sometimes ☐Rarely ☐Never
9. My _____ **cannot see me crying and gives in to my demands at once**
☐Almost Always ☐Sometimes ☐Rarely ☐Never
10. My _____ **does not consider my views/opinions**
☐Almost Always ☐Sometimes ☐Rarely ☐Never
11. When my _____ **is unwell, he/she prefers to have me around**
☐Almost Always ☐Sometimes ☐Rarely ☐Never
12. I and my _____ **have frequent fights over TV channels**
☐Almost Always ☐Sometimes ☐Rarely ☐Never
13. My _____ **has no time to help me when I need it**

- ☐Almost Always ☐Sometimes ☐Rarely ☐Never
14. Even though my _____ is tired, he/she agrees to help me with my school work if I ask
☐Almost Always ☐Sometimes ☐Rarely ☐Never
15. I can make my _____ change her/his plans to take me where I want to go
☐Almost Always ☐Sometimes ☐Rarely ☐Never
16. My _____ shares his/her worries with me
☐Almost Always ☐Sometimes ☐Rarely ☐Never
17. I can change the bad mood of my _____ by being with him/her ☐Almost Always ☐Sometimes ☐Rarely ☐Never
18. My _____ always treats me as a kid who knows nothing
☐Almost Always ☐Sometimes ☐Rarely ☐Never
19. My _____ asks me to go away when I try to interfere when he/she is busy
☐Almost Always ☐Sometimes ☐Rarely ☐Never
20. I hardly interact with my _____
☐Almost Always ☐Sometimes ☐Rarely ☐Never
21. My _____ does not allow me to express my opinion in family decisions
☐Almost Always ☐Sometimes ☐Rarely ☐Never
22. My _____ considers me as an important person in his/her life ☐Almost Always ☐Sometimes ☐Rarely ☐Never
23. My _____ frequently complains about me
☐Almost Always ☐Sometimes ☐Rarely ☐Never
24. I and my _____ enjoy sharing news with each other
☐Almost Always ☐Sometimes ☐Rarely ☐Never
25. I never know when my _____ is good to me and when s/he is bad to me
☐Almost Always ☐Sometimes ☐Rarely ☐Never
26. I would rather do things alone than with my _____
☐Almost Always ☐Sometimes ☐Rarely ☐Never
27. I can easily persuade my _____ to take me to a place I want to go
☐Almost Always ☐Sometimes ☐Rarely ☐Never
28. I can make my _____ to stop her work and play with me
☐Almost Always ☐Sometimes ☐Rarely ☐Never
29. I don't like the company of my _____
☐Almost Always ☐Sometimes ☐Rarely ☐Never
30. My _____ never lets me know if s/he is not well
☐Almost Always ☐Sometimes ☐Rarely

SMPCIA – FORM B

Relationship with the child:

Instructions The following statements aim to explore the relationship you have with your child. Kindly read each statement carefully and put a tick mark in an appropriate column. The blank space in the statement indicates *your child's name*. Each statement has four options to choose from – ‘Almost Always’, ‘Sometimes’, ‘Rarely’, ‘Never’. Each option is related to the frequency of behaviour. Depending upon how often you do/ do not do something referred to the statement, you must choose only one response. There are no right or wrong responses. Your honest responses are appreciated.

Example: Arvind is able to persuade me to take him for a movie.

In case you are successfully convinced by your child in this context most of the times, you need to choose ‘Almost Always’. In case you are never convinced by your child, you need to choose Never.

1. _____ can easily convince me to buy something he/she wants to eat
☐Almost Always ☐Sometimes ☐Rarely ☐Never
2. _____ can easily persuade me to take him/her to a place he/she wants to go
☐Almost Always ☐Sometimes ☐Rarely ☐Never
3. Even though I am busy, _____ is able to make me play with him/her
☐Almost Always ☐Sometimes ☐Rarely ☐Never
4. I always give _____ pocket money when he /she asks for it
☐Almost Always ☐Sometimes ☐Rarely ☐Never
5. I willingly give up something _____ likes to eat to pass it to him/her
☐Almost Always ☐Sometimes ☐Rarely ☐Never
6. I change my plans for the day to go out wherever _____ wants to
☐Almost Always ☐Sometimes ☐Rarely ☐Never
7. Even though I am tired, I agree to help _____ with school work if he/she asks
☐Almost Always ☐Sometimes ☐Rarely ☐Never
8. I always patiently listen to _____ when he/she has to say something
☐Almost Always ☐Sometimes ☐Rarely ☐Never
9. I consider _____ as an important person in my life
☐Almost Always ☐Sometimes ☐Rarely ☐Never
10. I share my worries with _____
☐Almost Always ☐Sometimes ☐Rarely ☐Never
11. I and _____ enjoy sharing news with each other
☐Almost Always ☐Sometimes ☐Rarely ☐Never
12. _____ can change my bad mood with his/her presence
☐Almost Always ☐Sometimes ☐Rarely ☐Never
13. I cannot see _____ crying and give in to his/her demands
☐Almost Always ☐Sometimes ☐Rarely ☐Never
14. When I am unwell, I prefer to have _____ around
☐Almost Always ☐Sometimes ☐Rarely ☐Never

15. However much _____ tries to make me eat, I will not eat something I don't like
☐Almost Always ☐Sometimes ☐Rarely ☐Never
16. When I am busy, I ask _____ to go away when he/she tries to interfere
☐Almost Always ☐Sometimes ☐Rarely ☐Never
17. I hardly spend time with _____
☐Almost Always ☐Sometimes ☐Rarely ☐Never
18. I do not think _____'s views/opinions are important
☐Almost Always ☐Sometimes ☐Rarely ☐Never
19. I am not interested in talks related to _____'s school
☐Almost Always ☐Sometimes ☐Rarely ☐Never
20. I do not have time to help _____ when he /she needs it
☐Almost Always ☐Sometimes ☐Rarely ☐Never
21. I cannot predict my behaviour as good or bad with _____
☐Almost Always ☐Sometimes ☐Rarely ☐Never
22. I don't like the company of _____
☐Almost Always ☐Sometimes ☐Rarely ☐Never
23. I would rather do things alone than with _____
☐Almost Always ☐Sometimes ☐Rarely ☐Never
24. I think _____ is an ignorant kid
☐Almost Always ☐Sometimes ☐Rarely ☐Never
25. I maintain a distance from _____
☐Almost Always ☐Sometimes ☐Rarely ☐Never
26. I do not allow _____ to express his/her opinion in family decisions
☐Almost Always ☐Sometimes ☐Rarely ☐Never
27. I hardly interact with _____
☐Almost Always ☐Sometimes ☐Rarely ☐Never
28. I and _____ have frequent fights over TV channels
☐Almost Always ☐Sometimes ☐Rarely ☐Never
29. I have frequent complaints about _____
☐Almost Always ☐Sometimes ☐Rarely ☐Never
30. I never let _____ know if I am not well
☐Almost Always ☐Sometimes ☐Rarely ☐Never

ACHIEVEMENT MOTIVATION INVENTORY

Instructions: This scale has 32 statements related to how you feel/ do/ behave in daily life. All statements may not fit you 100%. While some may be a very correct description of you, the others may somewhat resemble you while yet others may be not at all like you. Please read each statement carefully. Think of the description in relation to you and tick (✓) in only one appropriate column.

For example, if the description is – “*I like to be the best student in my class*” and you fully agree with the description, tick in the first column indicating ‘Completely agree’. If the statement describes you correctly for most times but not always, then tick in the second column ‘Mostly agree’. If the statement description of you is correct in very few or rare occasions, then tick in the third column ‘Agree to some extent’. If the statement’s description of you is unfit for most occasions, tick ‘Mostly Disagree’ column. If you don’t agree with the description at all, then tick ‘Completely disagree’ column.

Each child has different experiences; hence what you agree with may be different from your friend’s agreement. Remember to answer honestly as that there are no right or wrong answers.

	STATEMENTS	Completely Agree	Mostly Agree	Agree to Some Extent	Mostly Disagree	Completely Disagree
1	I feel I am a lazy person					
2	Days often go by without me having done a thing					
3	I like reading the biography of great people in order to learn how they overcome hurdles and achieved great things in life					
4	I plan ahead what subjects to study during my free time					
5	When I come to know that somebody like me, have achieved something great, I am motivated to do the something in a better way					
6	Most people who know me say that I am hard working and ambitious					
7	I go on postponing what I should be studying to day					
8	I take a lot of time to get started to the task of study					
9	Most evenings I kick back and relax rather than prepare for the next days school work					
10	Sometimes, I forget to do my homework					
11	I never leave a task/assignment I start, unfinished					
12	I enjoy working with people who score at my level or lower, rather than with those who are smarter and more hardworking than me					
13	I dislike failing in my school examinations due to unpreparedness					
14	I always work very hard to be among the best students in my school.					

	STATEMENTS	Completely Agree	Mostly Agree	Agree to Some Extent	Mostly Disagree	Completely Disagree
15	I find myself just taking life as it comes without planning					
16	I aim at reaching the highest level in Education					
17	When I grow up, I want to do something which others have not done					
18	I am basically a competitive person and I compete just for the sake of competing					
19	I believe that success in life has less to do with hard work and more to do with luck and being in the right place at the right time					
20	I enjoy reading all kinds of books including those that are not part of our school syllabus					
21	I shall be satisfied with an above average performance, even though it may not be my best					
22	I prefer to use my time for doing something else rather than trying to perfect something that I have already completed					
23	I enjoy spending most of my time alone concentrating on my school work					
24	I always try to stand out from the rest of my class in one way or the other					
25	I will go ahead with my plans only if I am sure that other people will approve of it					
26	I get restless and annoyed when I feel I am wasting time					
27	It is not a good idea to be always above others in achievement, because that may make them feel bad about themselves					
28	I like to be the best student in my class					
29	I enjoy finishing my school assignments even when they are difficult and time consuming					
30	I enjoy making friends with the most intelligent student in my class so as to keep up my standards of performances					
31	I like when people say in front of others that I am doing well in school					
32	I would like to deal with difficult situations, so that the blame or praise for its results come to me alone					

SELF EFFICACY QUESTIONNAIRE FOR CHILDREN

APPENDIX A4

Instructions: This scale has 24 questions related to how well you do things in different contexts related to experiences of daily life. Please read each question carefully and think of how well you do the things described in the question. There are 5 columns each one describing how well you do it. Tick in the appropriate column against the question based on your judgement of how well you do it.

For example, if the question is “*How well can you patch up a conflict between two of your friends?*” In case you think that you are extremely good in bringing two friends together who parted because of a fight, you should put a tick in the column ‘Very Well’. If you feel that though you are not successful in every case you are able to bring together two conflicting friends in most of the cases and are satisfied with that, you should tick in the column ‘Satisfactorily Well’. In case your success is limited only to a few cases and you feel that you could do better than that you must tick in the column ‘Somewhat Well’. On the other hand, if you feel that you don’t attempt to do such things you must tick in the column ‘Not Well’. However, if you feel that things worsen if you must tick in the column ‘Not at all well’.

You must remember that each of the description should be answered imagining yourself in the situation, and answer honestly. There is no right and wrong answers since experiences of children vary widely. So whatever is true in your case is the correct answer for you.

	STATEMENTS	Very well	Satisfactorily well	Somewhat well	Not well	Not at all well
1	How well can you get teachers to help you when you get stuck on schoolwork?					
2	How well can you express your opinions when other classmates disagree with you?					
3	How well do you succeed in cheering yourself up when an unpleasant event has happened?					
4	How well can you study when there are other interesting things to do?					
5	How well do you succeed in becoming calm again when you are very scared?					
6	How well can you become friends with other children?					
7	How well can you study a chapter for a test?					
8	How well can you have a chat with an unfamiliar person?					
9	How well can you prevent to become nervous?					

	STATEMENTS	Very well	Satisfactorily well	Somewhat well	Not well	Not at all well
10	How well do you succeed in finishing all your homework every day?					
11	How well can you work in harmony with your classmates?					
12	How well can you control your feelings?					
13	How well can you pay attention during every class?					
14	How well can you tell other children that they are doing something that you don't like?					
15	How well can you make yourself feel enthusiastic when you feel low?					
16	How well do you succeed in understanding all subjects in school?					
17	How well can you tell a funny event to a group of children?					
18	How well can you tell a friend that you don't feel well?					
19	How well do you succeed in satisfying your parents with your schoolwork?					
20	How well do you succeed in staying friends with other children?					
21	How well do you succeed in suppressing unpleasant thoughts?					
22	How well do you succeed in passing a test?					
23	How well do you succeed in preventing fights with other children?					
24	How well do you succeed in not worrying about things that might happen?					

Instructions: Here are five statements describing a student of your age group. All the five descriptions may not fit you 100% while some may be a very correct description, the others may somewhat resemble you while yet others may not at all like you. Please read each statement carefully. Think of the description in relation to you and tick (✓) in the appropriate column. For example, if the description is— “I get upset if I lose a game”. If you feel that you are a person who gets easily upset when you don’t win a game, then you have to tick in the first column ‘Very true for me’ against the statement. On the other hand, if you get upset sometimes then tick in the second column ‘Somewhat true for me’. In case you feel that you rarely get upset then tick the third column “Somewhat false for me”. Finally, if you feel that you never get upset on losing a game, you should tick in the last column “Very false for me”.

There are no right or wrong answers in this. Whatever is true in your case is the correct answer. Hence please answer honestly.

S.No	STATEMENTS	Very true for me	Somewhat true for me	Somewhat false for me	Very false for me
1.	When circumstances prevent me from achieving an important goal, I find it hard to keep trying				
2.	When an event I am looking forward to is cancelled, I lose the energy to arrange an alternative				
3.	When I don’t get what I want, I lose interest in my day-to-day tasks				
4.	If I have been working hard at something I lose motivation if I don’t get the reward I deserve				
5.	When something good I am expecting doesn’t happen, I feel less enthusiastic about life for a while				

SHORT GRIT SCALE

APPENDIX A6

Instructions: Here are eight statements describing a student of your age group. All the five descriptions may not fit you 100% while some may be a very correct description, the others may somewhat resemble you, while yet others may not at all like you. Please read each statement carefully. Think of the description in relation to you and tick (✓) in the appropriate column. There are no right or wrong answers in this. Whatever is true in your case is the correct answer. Hence please answer honestly.

For example, if the description is— “Failing in an exam discourages me”. If you feel that you definitely get discouraged on failing an exam, you should tick in the first column “*Very much like me*”. In case you would feel discouraged more often than not, then tick in the second column ‘*Mostly like me*’. If you would slightly feel discouraged then tick the third column ‘*Somewhat like me*’. On the other hand, if you would rarely feel discouraged then tick in the fourth column ‘*Not much like me*’. Finally, If you feel that you are a person who doesn’t get discouraged at all when you fail an exam, then you have to tick in the last column ‘*Not like me at all*’ against the statement.

	STATEMENTS	Very much like me	Mostly like me	Somewhat like me	Not much like me	Not like me at all
1.	New ideas and projects sometimes distract me from previous ones					
2.	Setbacks don’t discourage me					
3.	I have been obsessed with a certain idea or project for a short time but later lost interest					
4.	I am a hard worker					
5.	I often set a goal but later choose to pursue a different one					
6.	I have difficulty maintaining my focus on projects that take more than a few months to complete					
7.	I finish whatever I begin					
8.	I am diligent					

BIG FIVE QUESTIONNAIRE FOR CHILDREN

APPENDIX A7

Instructions This scale has 65 statements of different ways you possibly behave, feel or do things in your daily life. Please read each statement carefully and think how frequently you do/ feel/ behave that way. There are five options in the five columns indicating how frequently one behaves on the way described in the statement. Choose the appropriate column depending on how frequently you think it happens to you.

For example, if the statement is “*I feel irritated I cannot complete my homework.*” In case it happens to almost every day, you must tick (✓) in the last column ‘Almost Always’. In case it happens about twice a week you must tick in the column ‘Often’. If it happens to you once a month or so, you must tick in the column ‘Rarely’. If it happens to you only once in a while, you must tick in the column ‘Rarely’. In case this never happens to you, then you should tick in the column ‘Almost Never’.

There is no right or wrong answers in this. Every child’s experience is different. Hence whatever is the experience in your case is the right answer for you. Hence, please answer honestly.

S.No	STATEMENTS	Almost Never	Rarely	Some times	Often	Almost Always
1.	I like to meet with other people					
2.	I share my things with other people					
3.	I do my job without carelessness and inattention					
4.	I get nervous for silly things					
5.	I know many things					
6.	I am in a bad mood					
7.	I work hard and with pleasure;					
8.	I argue with others with excitement					
9.	I like to compete with others					
10.	I have a great deal of fantasy					
11.	I behave correctly and honestly with others					
12.	I easily learn what I study at school					
13.	I understand when others need my help					
14.	I like to move and to do a great deal of activity					
15.	I easily get angry					
16.	I like to give gifts					
17.	I quarrel with others					
18.	When the teacher asks questions I am able to answer correctly					
19.	I like to be with others					
20.	I engage myself in the things I do					
21.	If someone commits an injustice to me, I forgive her/him					
22.	During class-time I am concentrated on the things I do					
23.	I can easily say to others what I think					

S.No	STATEMENTS	Almost Never	Rarely	Some times	Often	Almost Always
24.	I like to read books					
25.	When I finish my homework, I check it many times to see if I did it correctly					
26.	I say what I think					
27.	I treat my peers with affection					
28.	I respect the rules and the order					
29.	I easily get offended					
30.	When the teacher explains something I understand immediately					
31.	I am sad					
32.	I behave with others with great kindness					
33.	I like scientific TV shows					
34.	If I take an engagement I keep it					
35.	I do something not to get bored					
36.	I like to watch TV news, and to know what happens in the world					
37.	My room is in order					
38.	I am polite when I talk with others					
39.	If I want to do something, I am not capable of waiting and I have to do it immediately					
40.	I like to talk with others					
41.	I am not patient					
42.	I am able to convince someone of what I think					
43.	I am able to create new games and entertainments					
44.	When I start to do something I have to finish it at all costs					
45.	If a classmate has some difficulty I help her/him					
46.	I am able to solve mathematics problems					
47.	I trust in others					
48.	I like to keep all my school things in a great order					
49.	I easily lose my calm					
50.	When I speak, the others listen to me and do what I say					
51.	I treat kindly also persons who I dislike					
52.	I like to know and to learn new things					
53.	I play only when I finished my homework					
54.	I do things with agitation					
55.	I like to joke					
56.	It is unlikely that I divert my attention					
57.	I easily make friends					
58.	I weep					
59.	I would like very much to travel and to know the habits of other countries					

S.No	STATEMENTS	Almost Never	Rarely	Some times	Often	Almost Always
60.	I think other people are good and honest					
61.	I worry about silly things					
62.	I understand immediately					
63.	I am happy and lively					
64.	I let other people use my things					
65.	I do my own duty					

COMPLIANCE SCALE FOR HYPERTENSIVE PATIENTS

APPENDIX A8

Instructions: The following scale aims to measure the extent to which you follow your treatment regimen in the management of **HYPERTENSION (High Blood Pressure/HBP/HTN)**. Kindly read each question carefully and put a tick mark (✓) in the appropriate column. Each question has six options to choose from. Each option is related to the frequency of your behaviour over a period of seven days (one week). Depending upon how often you do/ do not do something referred to the question you must choose your response.

None of the time (NT) = Not a single day in a week

Some of the time (ST) = one to two days in a week

Most of the time (MT) = three to four days in a week

All the time (AT) = almost every day

NA/DK= not applicable/ do not know

Example: How often do you forget to carry your purse?

In case you forget your purse about one to two times in a week on an average, you need to choose 'Some of the time'. In case you always carry a credit/ debit card, then you need to choose 'Not applicable/ Don't know' option.

S.no	Question	NT	ST	MT	AT	NA/DK
1.	How often do you forget to take your medicine for high blood pressure (HBP)?					
2.	How often do you decide not to take your medicine?					
3.	How often do you eat salty food?					
4.	How often do you eat fast food?					
5.	How often do you add extra salt to your food?					
6.	How often do you get the next appointment before you leave the clinic?					
7.	How often do you run out of HBP medicine?					
8.	How often do you miss taking your medicine because you feel better?					
9.	How often do you miss taking your medicine because you feel sick?					
10.	How often do you take someone else's HBP medicine?					
11.	How often you just don't bother about taking your HBP medicine?					
12.	How often do you check blood pressure level?					
13.	How often do you do the prescribed exercises e.g. morning walk?					
14.	How often do you substitute your exercise with household chores/ running errands?					
15.	How often do you cut short the duration of your exercise?					

Instructions This scale consists of ten statements describing your behaviour in day to day life. It may or may not be a correct description of you. Please read every statement carefully and record your agreement. If you feel it is the very correct description of you, then put a tick (✓) in the column 'Fully Agree'. If the description is particularly true in your case tick in the column 'Partially Agree'. In case the description is not correct in your case, then tick the column 'Don't Agree at all'.

1. I speak slowly and thoughtfully

☐ Fully Agree ☐ Partially Agree ☐ Don't Agree at all

2. I show my feelings openly

☐ Fully Agree ☐ Partially Agree ☐ Don't Agree at all

3. I easily get angry

☐ Fully Agree ☐ Partially Agree ☐ Don't Agree at all

4. I find myself hurrying even when I am not in a hurry

☐ Fully Agree ☐ Partially Agree ☐ Don't Agree at all

5. I often know better than those who decide

☐ Fully Agree ☐ Partially Agree ☐ Don't Agree at all

6. I never find enough time

☐ Fully Agree ☐ Partially Agree ☐ Don't Agree at all

7. I am trying to do many things at the same time

☐ Fully Agree ☐ Partially Agree ☐ Don't Agree at all

8. I want to get things done in a hurry

☐ Fully Agree ☐ Partially Agree ☐ Don't Agree at all

9. I get impatient if I have to wait

☐ Fully Agree ☐ Partially Agree ☐ Don't Agree at all

10. People often tell me to take it easy

☐ Fully Agree ☐ Partially Agree ☐ Don't Agree at all

Type D Scale-14

Instructions This scale consists of fourteen statements describing your behaviour in day to day life. It may or may not be a correct description of you. Please read every statement carefully and record your agreement. If you feel it is the very correct description of you then put a tick (✓) against 'True'. If the description is mostly true in your case, tick against 'Rather true'. If the statement doesn't apply to you at all, then tick against 'Neutral'. If the statement is mostly a false description of you, tick against 'Rather False'. If the description is absolutely false about you then tick against 'False'.

1. I make contact easily when I meet people

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

2. I often make a fuss about unimportant things

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

3. I often talk to strangers

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

4. I often feel unhappy

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

5. I am often irritated

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

6. I often feel inhibited in social interactions

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

7. I take a gloomy view of things

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

8. I find it hard to start a conversation

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

9. I am often in a bad mood

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

10. I am a closed kind of person

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

11. I would rather keep other people at a distance

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

12. I often find myself worrying about something

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

13. I am often down in the dumps

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

14. When socializing, I don't find the right things to talk about

☐ False ☐ Rather False ☐ Neutral ☐ Rather true ☐ True

HIGH BLOOD PRESSURE RECORD SHEET

MY NAME:

MY CLASS:

MY SCHOOL:

Instructions

This daily diary is for you, because you have taken the responsibility of taking care of your family members. All that you have to do is to remind your patient to take medicines, do exercise at the right time, and then see that he/she does not deviate from the prescribed diet.

Record in this diary every night on the following:

1. Has the patient taken the medicine?
2. Has the patient done the walking/ exercise/yoga he/she is supposed to do?
3. Has the patient taken proper diet (low fat, low salt, high fiber)?

You have to mark 'YES', 'NO', 'DK' (Don't Know) as appropriate.

For example, In case you are sure that the patient has taken the diet (low fat, low salt, high fiber) prescribed for high b.p. then tick column 'Yes'. In case you know for sure that the patient has not taken high salt/ high fat/ low fiber diet that day, then tick in column 'NO'. If you found that the patient has slightly deviated (by taking prohibited diet in only one meal) then tick in the column 'Partly'.

I will collect your diary once a week. Your recordings will have to be very honest. In case you forget to record on a day you may do so the next morning, but only after verifying. If you forget for two consecutive days, then please do not try to verify and fill up about things happened day before yesterday. Instead mention against the date 'Forgot Recording'.

In case the patient suffered from any symptoms like headache, tiredness, pain in chest, breathlessness, etc. anyday during the week, please mention the same by mentioning the date. Similarly in case the patient has visited the doctor for a scheduled check up please mention the same.

WEEK		MEDICINES			EXERCISE			DIET		
DAY	DATE	YES	NO	DK	YES	NO	DK	YES	NO	DK
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										

If you have forgotten to record any day, state why: _____

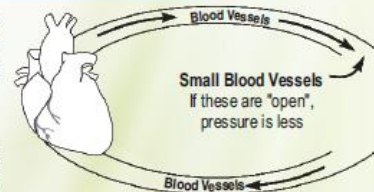
Any symptoms during the week? _____

HIGH BLOOD PRESSURE BOOKLET

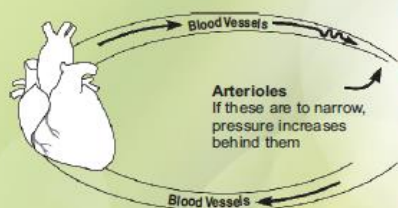
Blood pressure is the force exerted by the circulating liquid called blood against the walls of blood vessels. Everyone needs this blood pressure to send oxygen and nutrition for body functioning. Hypertension is just the medical term for high blood pressure (HBP).

What is the normal blood circulation?

The heart pumps and pushes blood into the whole body. Each time the heart contracts to push the blood, we have a heartbeat. Thus in a normal person the heart beats around 60 to 80 times in a minute. When the blood is pushed into the blood vessels, they can open wide or close thus pumping the blood forward.



What is high B.P.? What actually happens in the body?



If the small blood vessels remain open as the heart beats, blood pressure in the blood vessels remains normal. If they narrow, the blood has to be pushed harder and this leads to higher blood pressure. Thus pressure of blood on the walls of the blood vessels goes high. This results in high B.P.

High B.P. results from four common conditions

1. When the heart pushes more blood every minute
2. When the total amount of blood in the body increases.
3. When the thickness of blood increases requiring the heart to push harder.
4. When the blood vessels become narrow



How will I know that I have high B.P.?

Doctor checks for B.P. reading. Two measurements are given in each reading of the blood pressure. The upper (systolic) measure is the force required to pump the blood to the different organs of the body by the heart, which is always high.

The lower (diastolic) measure is the pressure of the blood on the vessels in resting state to prevent its collapse. A person is said to be hypertensive if three consecutive readings are $\geq 140/90$ mm Hg.

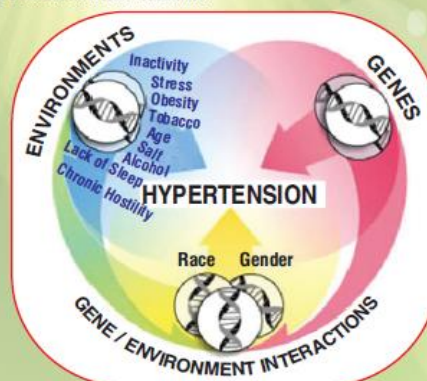
Blood Pressure Measures (for Adults ≥ 18 years age)

Diagnosis	Systolic Pressure (Upper #) mm Hg.		Diastolic Pressure (Lower #) mm Hg.
Normal	Less than 120	AND	Less than 80
Pre-hypertension	Between 120-139	OR	Between 80-89
Hypertension	140 and above	OR	90 and above

*This chart reflects blood pressure categories defined by the American Heart Association

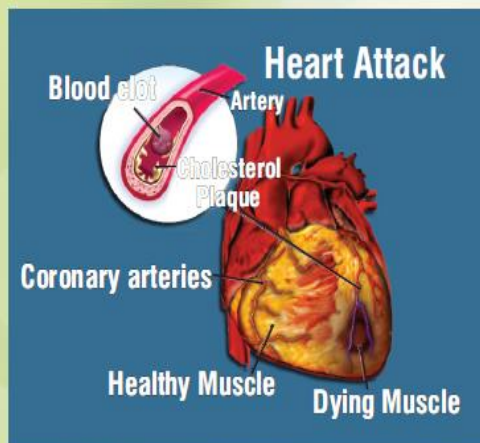
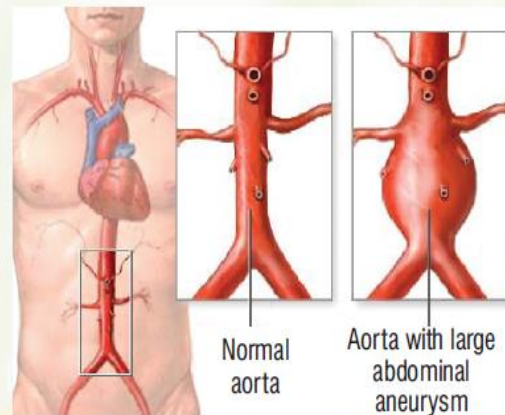
Why did I get it?

It is difficult to exactly pin point the actual cause of high B.P. It is caused due to the presence of one/more of these mentioned reasons.



What happens if the high blood pressure is not treated?

1. **Ballooning of the blood vessels because of the weakness (Aneurysm):** High BP will damage the walls of artery which may already be weak. This is called aneurysm. The wall may burst and bleed into the surrounding tissue.



2. **Heart Attack:** Fat and calcium accumulate in the walls of the artery to form a buildup. This is called a plaque like salt in a water pipe. This decreases the Blood flow through the blood vessels. When the plaque is large it completely blocks the blood flow. This leads to heart attack. Technically it is called Myocardial Infarction (MI).
3. **Heart Failure:** Due to narrowing down of arteries the heart has to pump forcefully. Repeated forceful pumping reduces the elasticity of heart muscles. This results in increasing the size of heart. Eventually heart begins to weaken till it can no longer pump leading to accumulation of fluid in different parts of the body. This is called congestive heart failure (CHF).

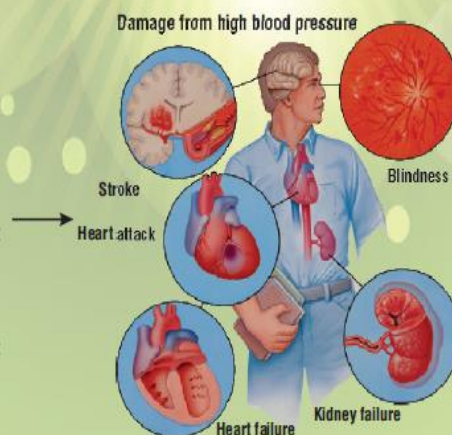
4. **Brain Stroke :** High B.P. is a major cause of stroke (paralysis) and bleeding in the brain. The paralytic strokes may or may not be cured completely.
5. **Damage of the Kidneys:** Kidneys filter the blood and remove the wastes by urination. When the blood vessels supplying blood to the kidneys are damaged, kidney tissues won't get the blood they need and kidneys themselves gradually lose ability to function. This can lead to kidney failure. When the kidneys fail, there is a failure in purification of blood. As a result, toxic wastes accumulate in the
6. **Damage of Eyes:** High BP can narrow the blood vessels in the eye. They may rupture and bleed. These changes can cause impaired vision and over time may lead to blindness.



Untreated High B.P. is a silent killer:

The harmful effects on blood vessels, heart, brain, eyes and kidneys happen very gradually over a period of time. The damage is slow and steady. Thus it comes to the notice only after the damage occurs.

Hence high B.P. is known as silent killer.



What can be done to control High B.P. ?

DO THE FOLLOWING:

Medicines:

1. Take the prescribed medicine without fail. It should form a part of your daily routine as brushing, bathing, eating and sleeping.
2. If you miss a dose of drug, take it as soon as you remember or continue with the next dose whichever is earliest.
3. **You must take the medicines lifelong.** If you are irregular with medicines then the blood pressure fluctuates. The pressure changes on the walls of the blood vessels increase the risk of their bursting.

Regular self-monitoring: Since High B.P. is a silent condition, it is recommended to check your B.P. regularly.



Lifestyle changes:

Exercise: Relaxes the muscle, releases the stress. It improves the blood circulation. Thus blood pressure comes down. A 30-45 minutes walking, gardening, jogging or swimming; 3-4 times a week helps to lower blood pressure.



Weight reduction: Even a small amount of weight reduction can help in lowering the B.P.

Diet : Take low salt, low fat, low starch, high fibre diet.



Quit Smoking: It causes the blood vessels to constrict thereby raising the B.P.

Adequate sleep: On an average, an adult should have a sleep of 6-8 hours a day.

Relaxation: Meditation can put your body into a state of deep rest, which lowers the blood pressure. Bio-feedback, Yoga and deep breathing also help.

DO NOT DO THE FOLLOWING

1. Never take the medicine prescribed for another person: The doctor prescribes different medicines for different patients. Such as
 - **Diuretics:** This is to drain more water and salt through urine in order to reduce the blood volume and pressure
 - **Beta blockers:** Some patients take this to reduce the workload on heart by decreasing both the rate of heart beat and the strength of heart's contraction.
 - **Vasodilators:** Some others take medicines to increase the diameter of the blood vessels.

You do not know what type of the above three medicines are prescribed for you and what type for the other person. Hence it is dangerous to take the medicines prescribed for the other person.

What diet should I take?

Diet:

- Take **more** of fruits and vegetables, oats, millets, fibers, pulses, nuts, whole grain foods, fish & poultry.
- **Reduce** salt, red meat, saturated fats, sugar, oil and starch in your food.
- Drinking too much alcohol can increase your blood pressure.
- **Salt** can raise BP by causing the body to retain fluid, which leads to a greater burden on the heart. Intake Limit should be less than 5gm/day from all food sources combined together.

*A tea spoon contains 5gms of salt.



Food items to be reduced by hypertensives	
A	B
- Table salt - Ajinomoto (tasting salt) - Cool drinks (sodium benzoate) like aerated soda water - Baking powder, Cooking soda - Fried foods, Snack foods 	Salt preserved foods - Pickles and canned foods - Dry fish, ketchups and sauces - Prepared mixes and ready to eat foods Highly salted foods Cheese, Papads, Peanut Butter, Potato Chips, Salted Biscuits, Salted Butter Bakery Products Biscuits, cakes, breads and pastries

What are the warning signals when you need to rush to a doctor?

Blurring of vision		Heaviness in the chest / Breathlessness	
Dizziness / Light headedness		Nausea / vomiting	
Fatigue		Confusion	
Headache (throbbing)		Drowsiness	

ASHER ANDREW

Senior Research Fellow (Psychology)
Centre for Health Psychology,
University of Hyderabad.

APPENDIX D1



UNIVERSITY OF HYDERABAD INSTITUTIONAL ETHICS COMMITTEE DECISION LETTER

IEC No.	UH/IEC/2018/34	Date of review	09-03-2021
Application No:			
Project Title:	Children as change agents in enhancing adherence to hypertension management in adults		
Principal Investigator/ Co-PI:	PI: Sandra Roshni Monteiro CI: Prof. Meena Hariharan		
Participating Institutes if any	----	Approval from Participating Institute	---
Documents received and reviewed	----		
In case of renewal submission of update	Application and Permission letters submitted		
Decision of the IEC:	Approved Duration: One year from date of approval		
Any other Comments Requirements for conditional Approval	----		
Members Present	Dr. A.S.Sreedhar, Prof. B. R. Shamanna, Dr. M. Varalakshmi, Sri.A. Madhava Rao, Dr. M. Srinivas, Dr. Deepa Srinivas, Dr. M.K. Arunasree and Ms. A. D. Shobhavath		

Please note:

- Any amendments in the protocol must be informed to the Ethics committee and fresh approval taken.
- Any serious adverse event must be reported to the Ethics Committee within 48 hours in writing (mentioning the protocol No. or the study ID)
- Any advertisement placed in the newspapers, magazines must be submitted for approval.
- If the conduct of the study is to be continued beyond the approved period, an application for the same must be forwarded to the Ethics Committee.
- It is hereby confirmed that neither you nor any of the members of the study team participated in the decision making/voting procedures and declared conflict of interest.

A S Sreedhar
09/03/2021

Chairman

(Dr. A S Sreedhar)

Shamanna
9/3/21

Member Secretary

(Prof. B.R.Shamanna)

Varalakshmi
09/03/2021

Convenor

(Dr. M. Varalakshmi)

Address: School of Medical Sciences, University of Hyderabad, C. R. Rao Road, Gachibowli, Hyderabad-5000046

Tel (O): +91-040-23135470/23135471 Email: iec_uohd@uohyd.ernet.in, deanmd@uohyd.ernet.in



हैदराबाद विश्वविद्यालय
UNIVERSITY OF HYDERABAD
(A Central University Established in 1974 by an Act of Parliament)

Centre for Health Psychology
Central University Campus P.O.
Prof. C. R. Rao Road, Gachibowli
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Phone: +91-40-23134790/4791, Fax: 23013228
URL: <http://www.uohyd.ac.in>
e-mail ID: meena.healthpsychology@gmail.com

Prof. Meena Hariharan

Date: 09/10/2018

To

Sub: Permission for data collection—regarding.

Madam/Sir,

Ms. Sandra Roshni Monteiro is a student of PhD Psychology programme, Centre for Health Psychology, University of Hyderabad. She is pursuing her PhD on the topic “**Agency of children in enhancing adherence to hypertension management of their hypertensive family member**”. The study is about creating awareness in students with high blood pressure (B.P.) and examining if children can help adults in their family with high B.P. in taking their medicines on time, and following the prescribed diet and exercise regularly. As a part of this, she has to interact with students of Class 6 to Class 9 from your esteemed institution, show them a video, and collect data from the parents/ adult members in the family with high B.P. Hence it is requested to permit her to work with your students to collect data in this regard. The collected data will be kept confidential and will be used for only academic purposes. The required proforma of informed consent and assent are enclosed for your kind perusal.

Thanking you,

Sincerely,

(Prof. Meena Hariharan)

Dear Parents & Guardians,

If you have high blood pressure, this is an opportunity for you to participate in a study that will help you manage your disease better.

How will participation help you?

High blood pressure can be dangerous if untreated and ignored. As busy adults, we often forget to remember simple things like taking medicines, exercising, and maintaining healthy diet. Also, the habits you follow are modelled by the child and they imitate it into their daily lifestyle. The result? As children progress into adulthood they become victims of the lifestyle disorders much earlier than you were diagnosed of it because of their additional sedentary and technology oriented lifestyle.

What do you have to do?

You will be given a free blood pressure check-up done and you will have to answer a few questions related to your health. After a month, you can come and collect your report, get a second BP check up done, and watch a complete informational video on High Blood pressure and get all your queries answered.

Between this your child will be trained for one hour per week for 4 weeks to help them understand your disease, so they can remind you to take medicines on time, follow prescribed diet, and exercise regularly. To make it a habit we want them to take care of you for 6 weeks.

Who can take part?

If any family member staying in the same house as the child has High BP, can take part in the workshop. Please provide your information below

All information provided by you shall be kept entirely confidential and be used for research purposes only.

Should you have any query, kindly contact at 9830922845, or email at monteiro.san10@gmail.com.

If you are interested, Kindly return the form tomorrow with the following details:

Name of the person / persons with high BP

Age

Gender

Duration of high BP

Child's name:

Class

Relationship with person having high BP

INFORMED CONSENT FORM
University of Hyderabad
Centre for Health Psychology

APPENDIX D4

Why is your child chosen as a participant?

We are conducting a study to find out the effectiveness of children as change agents for adult health—particularly high B.P. (blood pressure) in adults. We are approaching for your consent to allow your child to participate in the study because one of the adult members in your family is diagnosed with high B.P. We are trying to find out if children can be effective agents in helping adults with high B.P. by making them take their B.P. medicines on time, stick to their prescribed diet and exercise.

What is expected from the child?

Our study proposes to identify the children's power of influence on adult personality type, motivational level, frustration tolerance, and strength of perseverance because these factors may determine the effectiveness of children in being a change agent.

In order to find out the above psychological aspects we will be giving 10 questionnaires to your child and 4 to the identified hypertensive family member, once at the beginning of the study and again at the end of the study. Your child has to answer the questionnaires in a classroom along with other children participating in the study. The questionnaires will be given in a staggered manner so that the child answers them without getting fatigued. These questionnaires relate to few psychological aspects such as motivation, personality, interpersonal influence, etc. The children will get enrolled into the study only after you sign this informed consent form. In addition to these questionnaires your child will also be shown a thirty minute video clipping explaining relevant information about high blood pressure.

If you consent your child's participation in the study we will work with your child for a period of 3 months. During these three months, your child will be required to maintain a diary about the regularity of medication, diet and exercise of the adult patient with high blood pressure in your family. I will administer questionnaires on adult with hypertension in your family on prior appointment.

Confidentiality

The identity of your child and the adult patient will not be revealed to anybody. The information collected will be used only for research purposes where the projected information will be for the entire group of 300 children participating in this study, where individual identity will not be revealed.

Is participation in this study compulsory?

It is not mandatory for your child to participate in this study. Even after enrolling in the study you or your child may decide to withdraw at any point of time without citing any reasons.

In case you have any questions or need any clarifications, I will be glad to respond to you now or later. You may contact me on the following phone number + 91 9642288245, or email – monteiro.san10@gmail.com.

Consent

I, _____ (your name), have read all the information related to the research on children as change agents for effective management of hypertension. I was given sufficient time to reflect on the issue. I was also given sufficient opportunity to have my questions clarified. With full knowledge about the proposed research I give my consent to have my child participate in the research.

Signature

Name:
Address:

Contact No.

INFORMED ASSENT FORM

University of Hyderabad
Centre for Health Psychology

APPENDIX D5

I was explained about the proposed research on *children as change agents as effective management of hypertension*. I was informed that my parent (mother / father) has agreed for my participation in the study. I wish to state that I agree to be a part of this study.

Name:

Class:

School:

Signature of class teacher

Steps to find Mutuality Indices of the Mutual Interpersonal Relationship Scale:

1. Let x_i be the score for i^{th} item of Group X (here, children). Similarly, raw score of i^{th} item of Group Y (hypertensive adults) be y_i . An average of the child's score and the hypertensive adult's score was obtained. For eg. For item 1 if the child's score is 3 and the hypertensive adult's score is 5, an average of the scores is obtained, i.e., 4. This was done for all the items for all the 181 pairs of respondents.
3. To find overall mutuality across all the items for each pair of respondents, an average of the above obtained mutuality scores for further averaged for all the items. A mutuality index was found. This index was considered a representation of the perceived influence of the child on the adult. The indices for all 181 pairs is provided below.

Table. *Showing obtained mutuality index scores for each pair of respondents*

Pair No.	Mutuality index	Pair No.	Mutuality index	Pair No.	Mutuality index	Pair No.	Mutuality index
1	2.30	31	2.25	61	2.15	91	2.62
2	2.75	32	2.35	62	2.52	92	2.52
3	3.50	33	3.27	63	2.35	93	2.38
4	2.02	34	2.27	64	2.38	94	2.55
5	2.05	35	2.40	65	2.37	95	2.35
6	2.28	36	2.48	66	2.33	96	3.08
7	3.23	37	2.75	67	3.00	97	2.37
8	2.48	38	2.70	68	2.28	98	2.23
9	2.57	39	2.82	69	2.80	99	2.62
10	2.40	40	2.02	70	2.17	100	2.85
11	2.37	41	2.27	71	2.38	101	2.50
12	2.43	42	2.27	72	2.40	102	2.77
13	2.10	43	2.85	73	3.17	103	2.03
14	2.20	44	2.13	74	2.27	104	2.10
15	2.88	45	2.60	75	2.38	105	2.68
16	2.50	46	2.68	76	2.22	106	2.63
17	2.45	47	2.27	77	2.68	107	2.72
18	2.47	48	2.28	78	2.92	108	2.15
19	2.53	49	2.27	79	2.72	109	2.53
20	2.65	50	2.48	80	2.28	110	2.88
21	2.33	51	2.13	81	2.90	111	2.33
22	2.63	52	2.23	82	2.38	112	2.30
23	2.73	53	2.23	83	2.53	113	2.57
24	1.93	54	2.37	84	2.48	114	2.48
25	2.40	55	2.38	85	3.25	115	2.48
26	2.38	56	2.75	86	2.45	116	2.40
27	2.53	57	2.53	87	2.95	117	3.28
28	2.18	58	3.22	88	2.53	118	2.57
29	2.53	59	2.48	89	2.65	119	2.85
30	1.95	60	2.63	90	2.83	120	2.70

Pair No.	Mutuality index	Pair No.	Mutuality index	Pair No.	Mutuality index
121	2.55	151	2.20	181	2.35
122	2.33	152	2.60		
123	2.57	153	2.68		
124	2.60	154	2.47		
125	2.32	155	2.50		
126	2.72	156	2.42		
127	2.78	157	2.28		
128	2.52	158	2.33		
129	2.47	159	2.63		
130	2.45	160	3.07		
131	2.43	161	2.70		
132	3.07	162	2.53		
133	2.97	163	2.43		
134	2.75	164	2.43		
135	2.97	165	2.58		
136	3.02	166	2.90		
137	2.32	167	2.55		
138	2.45	168	2.52		
139	2.37	169	3.45		
140	2.40	170	2.35		
141	2.33	171	2.97		
142	2.62	172	2.55		
143	2.47	173	2.53		
144	2.67	174	2.75		
145	2.50	175	2.40		
146	2.43	176	2.53		
147	2.87	177	2.20		
148	2.17	178	2.20		
149	2.48	179	2.15		
150	2.07	180	2.27		

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Perceptions of Health: a Developmental Trend in Indian School Children

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Abstract

The potential for children to be used as agents of change in health research and practice is being increasingly valued. To reach this objective, it is foremost to gauge children's perceptions about health, based on which future pathways to health promotion programs may be built which are easily comprehensible to children. Therefore, this study was conceptualised to understand the way school children perceive health and track the changes in their comprehension of health. Basing on a cross-sectional design, a sample of 667 children belonging to Class 6 to 10 from three different Indian schools were selected. These children having similar socioeconomic status and education curricula were asked to respond to an open-ended question—What do you understand by 'being healthy'? The obtained qualitative data were analysed by means of content analysis to explore categories or themes of responses. Divergence of conceptualisation was measured through calculation of entropy. The three emerged major themes—Meaning of health, Ways to be healthy, and Indices of health—represented children's health perceptions. The entropy values revealed a steep rise in the divergence in perceptions of health of Class 10 children compared to plateau in perceptions of children of lower classes. Implication and limitations of this study were also discussed.

Keywords Concept of health · Children's conceptualisation · Indian children · Content analysis · Entropy · Cross-sectional design

1 Introduction

World Health Organisation (WHO) defined health as a state of complete physical, mental, and social well being, and not merely the absence of disease or infirmity.

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Bircher (2005) has also given a holistic definition of health as a “dynamic state of wellbeing characterized by physical, mental and social potential which satisfies the demands of life commensurate with age, culture and personal responsibilities. If the potential is insufficient to satisfy these demands this state is disease.”

The concept of health is interpreted in various ways—sometimes restricted to a uni-dimensional understanding of illness, or a partial acknowledgement of health promoting and health risk behaviour, and rarely as a wholesome understanding of the broad concept of health. Health education formally and informally begins at a young age through family, peer group, or school curriculum. Thus, children’s perception of health is an important subject as it lays the foundation for their health literacy. Comprehending health at an early stage assumes great significance as the cognitive base paves the path to future health promoting or health risk behaviour. Insight into children’s perceptions of health is important in view of its significant influence on various dimensions of life, particularly related to health behaviour. The understanding of the complexities of health behaviour begins at an early age (Almqvist et al. 2006; Goldman et al. 1991; Tinsley 1992) and is reflected over time in the attitudes and beliefs sustained in adulthood inadvertently affecting their wellbeing (Susman et al. 1992). According to Zaloudikova (2010), the subjective perception of health and illness has fundamental influence on the behaviour of the given person in respect to his or her own health.

Research on childrens’ understanding of health and illness has concentrated more upon the age and cognitive developmental differences in children’s conceptualisations of health and illness. With Piagetian theory of cognitive development as a theoretical base, studies (Kalnins and Love 1982; Bibace and Walsh 1980) have been conducted on children of different ages revealing that the concepts of health and illness mature with cognitive developmental changes. For example, children’s concepts of health shift from being behavioural indicators of health (engaging in healthy practice) to describing them in abstract states (feeling good). Cognition on the concept of health with its complexities is found to follow a developmental trend well in line with Piaget’s cognitive development. Williams and Binnie (2002) found a significant difference between four-year old and 7-year old children in their understanding of different ailments in terms of aetiology.

Natapoff (1982) investigated into children’s concept of health by interviewing 264 children within the age group of 6 to 12 years belonging to 1st, 4th, and 7th grades. The results revealed a cognitive developmental trend in conceptualizing health. The study clearly indicated children’s concept of health following Piagetian concept of cognitive development. This study found that younger children failed to understand the cause and effect relationship in the context of health, while older children conceptualised health and illness with the idea of mutual reversibility. Children above 10 years conceptualised health holistically by including mental health. The results of the study by Williams and Binnie (2002) were in line with that of Natapoff. Their study attempted to understand the children’s concept of illness by interviewing 60 children belonging to age 4 and age 7. They found a significant age difference in the level of sophistication in the children’s understanding of illness. However the level of understanding of children was found to improve after intervention. Goldman et al. (1991) conducted an intensive study on 27 children using a combination of interview, open-ended question and observation. The results revealed that children’s concept of health represented five characteristics namely causation, identity, consequence, timeline, and cure. Further the study reiterated

developmental trend following Piaget's model (1951) in understanding children's understanding of health and illness. Children in the age group of 9 to 11 years exhibited divergent ideas on being healthy or unhealthy referring to nutrition, environment, cleanliness, and mental health (Reeve and Bell 2009). Mouratidi et al.'s (2016) study that compared two samples consisting of adults and children clearly tracked a developmental trend with younger group of children understanding health and illness from a biomedical perspective, while older children depicting multi-faceted comprehension, and adults responding from a psychosocial angle.

However, there are claims that the Piagetian approach underestimates children's understanding of illness. The criticisms of Piagetian research argues that the stage theory underestimates children's abilities such as reasoning about physical phenomenon (Baillargeon 1993) and conversion of number. Furthermore, Hergenrather and Rabinowitz (1991) proposed that it is incorrect to use Piaget's stages to plot the development of illness concepts as Piaget's stages refer to children's logic and capability for certain types of thought, not to their understanding. Carey (1985) also argued that illness and health cannot be conceptualised as a part of a domain-general Piagetian framework as children's reasoning skills are very different across domains.

Few recent studies are in line with earlier ones indicating a developmental trend while others suggested a combination of simple and complex perception (Mouratidi et al. 2016). The opportunities for accessing health information has widened in the past decade. This has a possibility of children perceiving health in a more complex and holistic way. Youssef et al. (2010) conducted a study on 472 Egyptian children in the age group of 9 to 11 years to understand their concepts of health, illness, and risk factors using 'draw and write' technique. The findings revealed a trend that was different from the earlier studies. The responses indicated a majority of children having a mixed concept of health that included biomedical and holistic definitions extending to the emphasis on healthy lifestyle. The major source of information for them was cited as media. It is very important to understand the developmental progression or trend of perception of health among children. This would enable us to design health interventions in sync with the comprehensions of children so as to optimize the intervention outcome.

Comprehending health in holistic perspective demands understanding of health protective behaviour (related to nutrition and hygiene), health promotive behaviour (related to lifestyle aspects), and health risk behaviour (abstinence of substance use, unprotected sex). In this context it is relevant to mention that as the health risk behaviour of smoking begins at adolescence (Global Youth Tobacco Survey Collaborative Group 2003) or triggered at childhood when a family member is a chronic smoker (Leonardi-Bee et al. 2011), it is very essential that they understand the statutory warning on cigarette packets. However, a study by Borzekowski and Cohen (2013) revealed that a large percentage (62%) of children did not comprehend the warning on cigarette packets. The study had revealed that Indian children had the lowest level of comprehension compared to children from China, Brazil, Pakistan, Nigeria, and Russia. Most of the research in this area of children's conceptualisation of health and illness has studied children from developed countries. Thus, as pointed out by Skelton and Croyle (1991), there is a dire need for research examining the issues among children in developing countries.

Research in the past has classified children's perceptions of health into three basic categories: (a) biomedical, (b) psychosocial, and (c) healthy lifestyle representations

(Campbell 1975; Natapoff 1982; Piko and Bak 2006; Zaloudikova 2010). These categories match the categories specified in the official definition of health given by the World Health Organisation (WHO 1948). The biomedical category comprises representations of biological and medical processes related to health or the absence of specific diseases and symptoms (Campbell 1975; Natapoff 1982; Piko and Bak 2006; Reeve and Bell 2009; Zaloudikova 2010). The psychosocial category includes perceptions of healthy and cheerful humans (Piko and Bak 2006), able to enjoy joyful activities (Natapoff 1982; Piko and Bak 2006; Zaloudikova 2010). The lifestyle categories refers to activities that could potentially affect an individual's health, e.g. specific eating habits and exercise (Piko and Bak 2006; Youssef et al. 2010; Zaloudikova 2010). Previous findings suggest that children define health by incorporating all its different dimensions (Onyango-Ouma et al. 2005; Reeve and Bell 2009; Youssef et al. 2010). Piko and Bak (2006) conducted a study on 128 primary school children (8 to 11 years) to understand children's beliefs of health, illness, health promotion and disease prevention. An equal percentage of children seem to hold biomedical and biopsychosocial concept of health. The study indicated that children's concepts were found to have reference to their past experience. Children in the age group of 9 to 11 years exhibited divergent ideas on being healthy or unhealthy referring to nutrition, environment, cleanliness, and mental health (Reeve and Bell 2009).

Children's perception of health has been studied by adopting various methods. A number of researchers have preferred to adopt projective methods such as auto-documentation using small notebook and camera (Reeve and Bell 2009), drawing pictures (Onyango-Ouma et al. 2005) and use of vignettes (Buchanan-Barrow et al. 2003; Williams and Binnie 2002). There are also studies that used semi-structured (Myant and Williams 2005) and in-depth interview (Marin 2010; Fernandes et al. 2014), questionnaires (Wahl et al. 2012), or knowledge tests (Cordingley et al. 2012). All the methods have their inherent strengths and weaknesses. While the projective methods may work better with younger age groups, subjectivity involved in scoring and interpretation is a factor to be considered too. On the other hand, the questionnaire, scales, other forms of measure that suit the older age groups may not be of help when the study aims to compare the younger age groups with that of the older. Hence, the method that meets the purpose of comparing different age groups may be open-ended question(s) with clear instructions. However, the responses need to be treated with rigorous qualitative and quantitative analyses in order to protect objectivity and scientific rigour. The present study used an open-ended question.

1.1 Research Questions

The study attempted to answer to two research questions. First, how do school children conceptualise 'health'? Second, does the concept of health show a progressive change across age?

1.2 Objectives

Health habits are formed in childhood and sustained thereafter. Pre-adolescence and adolescence are critical stages for inculcating desirable health behaviour. This demands the right perception and cognition of health. It is of research interest to examine the

progressive changes in conceptualising the meaning of ‘being healthy’ across ages during the pre-adolescence and adolescence period. The objectives of this study were formulated in the following ways—(i) understand the way high school children in India conceptualise ‘health’ and (ii) track the changes in comprehending ‘health’ among Indian school children from Class 6 to Class 10.

2 Method

2.1 Research Design

The design of the study fits into a qualitative framework. The methodology of data collection followed a single open ended question where the responses were put through content analysis following thematic approach. The data were analysed using descriptive statistics. The study involved an innovative method of quantifying the complexity of the concept of health by applying a new formula to measure complexity through entropy.

2.2 Participants

Following a cross-sectional design, the sample was drawn in two stages. In *first* stage schools were identified based on purposive sampling. Two inclusion criteria were followed to identify the schools. First, the schools must be catering to the children from low socioeconomic status. Second, the curriculum of the schools must be similar. Following these two criteria, one Social Welfare Residential School that catered to the students from socially marginalised sector, run by the State Government, one school that is run by a private Cement Industry in a remote district majorly catering to the needs of the children from neighbourhood tribal hamlets, and one school run by a Christian Missionary for the children coming from socioeconomically backward families were included.

In *second* stage, all the children in these schools from Class 6 to Class 10 were included as participants of the study. The initial total sample consisted of 712 children of which 402 were boys (56.46%) and 310 were girls (43.54%). After dropping the participants whose written responses were either illegible or did not make any meaning, the final sample was 667 participants. This sample consisted of boys (55.77%) and girls (44.33%). They belonged to Class 6 (22.03%), Class 7 (23.24%), Class 8 (23.54%), Class 9 (21.74%) and Class 10 (9.44%). The age range of the children is between 11 to 16 years.

2.3 Procedure

The procedure explains data collection, content analysis method, and method of calculating “entropy” for measuring the complexity of the concept of health. Informed consent was taken from the Principals of the selected schools and class teachers of the classes concerned. All participants consented to participate. The participants were assembled in their classes and were provided with a lined sheet of paper. One side of the paper sought the demographic details, such as name, age, gender, and Class; and on the other side a question—“What do you understand by ‘being healthy’?”—was printed. No time limit was specified to complete the answer. The students were

instructed to give a descriptive answer to the question in the way they perceived health and they were asked to write their responses in English or the two local languages—Hindi and Telugu, in the limited space of six lines provided in the sheet. The descriptive responses of participants were manually analyzed using content analysis, thematic approach. The responses were independently handled and coded by the investigators. The verbatim responses of each participant were read and re-read several times to gain a holistic picture of the responses. Memos of specific meaning units were noted down in the margin of the response sheets. These units of information were carefully examined and similar responses were collated under different sub-themes or categories on the basis of inductive process. Three broad themes, viz, meaning of health, ways to be healthy, and indices of health emerged out of content analysis. Under each theme the sub-themes were identified.

One method of measuring the extent of divergence in response is through calculation of entropy. The concept of entropy originates from Physical Sciences that are broadly interpreted as the degree of disorder. The method of measuring response divergence of conceptualizing ‘diabetes’ was used by Padhy et al. (2018), and also was used in measuring the diversion in conceptualizing HIV/AIDS among students was used by Nagpal et al. (2017). Applied in the context of responses, to the issue of understanding of ‘being healthy’, entropy is operationally defined as the extent of variations in the responses of children belonging to a particular Class/Grade.

2.3.1 Mathematical Derivation of Entropy

Step 1: After the responses were categorised, the ratio of responses for each of the three major themes was calculated for a particular Class of students using the following formula. It suggests the probability of response occurrence; to be more specific the ratio of responses to the theme (P).

$$P = \frac{\text{Number of responses per theme}}{\text{Total number of responses of each class of students}}$$

Step 2: This ratio was logarithmically evaluated to convert the value into easily interpretable friendly scale. The output value after logarithmic transformation is denoted as ‘ I ’. In this context, ‘ I ’ refers to the information of the response occurrence. The treatment applied is expressed as

$$I = -\log(P)$$

Step 3: Now the value is ready for evolving a score indicating absolute entropy, denoted as ‘ E ’. The entropy was computed using the formula.

$$E = \sum (P \times I)$$

The value of absolute entropy in this study is derived as a sum of logarithmic values of the three themes. The formula is expressed as

$$E = P_m I_m + P_w I_w + P_i I_i$$

Where,

- m Meaning of health;
- w Ways to be healthy;
- i Indices of health

This value of absolute entropy indicates divergence of ideas of each Class. Simply, it is the abstraction of the distribution of responses across themes for each Class. Higher value of entropy indicates higher divergence of conceptualisation of 'being healthy' for a Class of student. In case of convergence or uni-dimensionality of ideas, the entropy is indicated by a low value, or even '0'. The composite score of entropy is the measure of complexities with which the idea of being healthy is construed. The composite value of entropy is implicitly affected by the size of the Class of students which is not uniform in the sample studied. Therefore, an attempt is made to neutralise the varying sample size in different classes of students. Towards this end the entropy value is divided by the Neutralising Ratio between the class size and the total sample. The ratio between sample size in a Class and the total sample is calculated using the following formula to derive a Balancing Factor denoted as B_F .

$$B_F = \frac{\text{Sample size of a Class of students}}{\text{Total sample size of students}}$$

Step 4: The final score of entropy neutralised for varying samples of different classes, denoted as E_n (Neutralised entropy) is calculated by the following formula.

$$E_n = E/B_F$$

3 Results

The results are discussed from qualitative angle of content analysis as well as quantitative angle, where divergence of response for each Class was calculated by computing entropy values.

3.1 Qualitative Analysis

By following the thematic approach of content analysis as described under the 'method' section, three broad themes emerged, namely 'meaning of health', 'ways to be healthy', and 'indices of health'. Each theme had revealed sub-themes under which the responses converged. These themes and their corresponding sub-themes are presented in Table 1A. These themes and sub-themes are for the whole sample.

Under the first theme, i.e. 'meaning of health', health was described as a multidimensional concept—living a good life, good genetic loading, health as an asset, having health awareness, no physical or mental illness, and as God's gift. The sub-themes under this category ranged from health as a divine blessing or genetic loading over which there is no control of the individual to leading a good life or possessing knowledge of health where the individual has a definite role to play.

The second theme refers to ‘ways of being healthy’ where all the sub-themes connoted a line of behaviour on the part of the individual to be healthy. The sub-themes included a number of action points indicating a definite role of the individual by adhering to a balanced diet, adequate water intake, indications of healthy habits, maintenance of personal and environmental hygiene or simply health promoting behaviour like exposure to sunlight and avoidance of health risk behaviour such as keeping off from junk food.

The third theme relates to ‘indices of being healthy’. The sub-themes referred to were from a broad spectrum of biopsychosocial indicators such as physical strength, ideal body mass index, ability to work hard, longevity of life, and agility as biological/physical indices. Peace, effective coping, enjoying leisure time, and good cognitive skills as psychological indices. Enjoyment of life, success, high academic performance, perfectionism, and community involvement were the psychosocial indicators.

As Table 1 gives a picture of the overall sample without categorizing them into classes, Table 2 presents the sub-themes that were common to different classes along with a model response (only when more than 30% of the Class responded to corresponding sub-theme it was included under ‘Common Theme/Sub-theme’).

It may be observed from Table 2 that defining health as ‘absence of disease’ was a predominant common response from students across classes. Similarly under the theme of *Ways to be Healthy* students belonging to all classes mentioned the sub-themes emphasizing on having a balanced diet, avoiding junk food, practicing physical exercise and yoga, maintaining good sleep and personal hygiene. Interestingly, students of Class 7 were exceptions in emphasizing the need for environmental hygiene. With reference to the theme on *Indices of Health*, students of all classes mentioned being active and energetic as a predominant feature. The ability to play well was mentioned only by students of Class 6, 7, and 8.

While it is necessary to present the themes and sub-themes common to the classes, it is equally significant and relevant to throw light on the themes, sub-themes, and responses unique to each Class. Table 3 presents the sub-themes and responses unique to different classes. The responses were considered as unique only when 1 to 5% in the Class responded corresponding to a particular sub-theme.

It may be observed from Table 3 that the students of Class 6 were unique in the response revolving around food and beverage. The responses were related to eating the right quantity (no overeating) at the right time (eating on time) in the right way (chewing well). Typically the unique response related to *Index of Health* as ‘good digestion’. The unique responses of Class 7 featured avoidance of oily food under the theme of *Ways to be Healthy* and good academic performance as an Index of Health. The table indicates that the sub-themes of children of Class 8 were psychosocial in nature. The unique sub-themes were ability to ‘adapt to situations’, ‘having healthy interpersonal relations’ and ‘coping with stress’. Students of Class 9 had unique sub-themes such as adequate rest and sleep as *Ways to be Healthy* and the longevity of life as an index of health. Students belonging to Class 10 uniquely mentioned about mental health and corresponding positive affect state, and internal peace as *Indices of Health*. Further they suggested regular health check up as a measure to be healthy.

Based on the common and unique responses of children of different classes, the class-specific definition of ‘being healthy’ is inferred in the following way. While

Table 1 Themes, sub-themes, and specimen responses of participants

Themes and Sub-themes	Sample Responses
1. Meaning of health	
God's gift	Health is a gift given by God (Boy, Class 9)
Genetic contribution	Healthy body is given from family (Boy, Class 6)
Health as an asset	Health is considered bigger than wealth (Boy, Class 8)
Multidimensional concept	Health is nothing but being physically fit, mentally strong and being moral, spiritual and intellectual (Girl, Class 10)
Living a good life	I understand that being healthy means having a good life (Boy, Class 6)
Awareness of diseases	We should be aware of diseases and behave in a proper way (Boy, Class 9)
No physical or mental illness	Not having any illness is being healthy(Boy, Class 6)
2. Ways to be healthy	
Balanced diet	Eating fruits and taking balanced diet is good for health (Girl, Class 8)
Adequate water intake	Drink plenty of water (Girl, Class 8)
Avoidance of junk food	Avoid fried snacks, oily food, and junk food. They make a person put on weight and lead to digestive problems (Boy Class 6)
Healthy habits	We should brush our teeth twice a day, wash hands before eating and go to sleep timely (Girl, Class 9)
Environmental hygiene	We should maintain clean surroundings (Girl, Class 8)
Personal hygiene	I understand that being healthy requires us to keep our body clean by bathing, brushing our teeth, washing our hands and wearing clean clothes (Girl, Class 7)
Exposure to sun	We should wake up before sunrise, we take vitamin D from sun (Girl, Class 7)
Yoga and exercise	We should exercise daily and do yoga in the morning (Boy, Class 7)
Sleep hygiene	We should sleep and wake up early and on time daily (Boy, Class 7)
Avoidance of smoking	Some people smoke which is not healthy(Girl, Class 8)
Adequate rest	We should take proper rest and sleep (Boy, Class 9)
3. Indices of health	
Enjoyment of life	Being healthy helps us enjoy our life(Boy, Class 8)
Ideal body mass index	Good figure according to age and height(Boy, Class 7)
Peace	Being peaceful is a sign of health (Girl, Class 10)
Strength	Being very strong is healthy (Boy, Class 7)
Success	Health is important for success (Girl, Class 8)
Ability to work hard	If one is healthy one can work hard (Boy, Class 6)
Playing	If we are able to play outdoor games, then we are healthy (Girl, Class 10)
High academic performance	We are able to write exams and do well because we are healthy (Girl, Class 6)
Effective coping	Can solve all problems if one is healthy (Girl, Class 8)
Leisure time	A healthy person can enjoy leisure (Boy, Class 8)
Agility	You can do all activities quickly when you are healthy (Girl, Class 7)
Perfectionism	Being perfect in work is healthy (Boy, Class6)
Longevity of life	Being healthy will ensure a long life (Boy, Class 9)
Community involvement	To be healthy we need personal care as well as community involvement (Boy, Class 9)
Good cognitive skills	If we are healthy, we can think fast and clearly (Boy, Class 8)

Table 2 Common Themes, sub-themes, and specimen responses of participants across different classes

Themes and Sub-themes	Classes	Sample Responses
1. Meaning of Health		
Absence of disease	6,7,8,9,10	"A healthy person cannot have diseases" (Boy, Class 10)
2. Ways to be healthy		
Balanced diet	6,7,8,9,10	"It is important to follow a balanced diet for healthy life" (Girl, Class 8)
Avoiding junk food	6,7,8,9,10	"To stay healthy a person must avoid junk food" (Boy, Class 7)
Physical exercise & yoga	6,7,8,9,10	"Should do exercise and yoga which will make one healthy and active" (Girl, Class 9)
Adequate sleep	6,7,8,9,10	"Sleeping early and waking up early keeps you healthy" (Boy, Class 8)
Personal hygiene	6,7,8,9,10	"Take personal care of yourself. e.g. comb hair, brush" (Boy, Class 6)
Environmental hygiene	6,8,9,10	"Keeping surroundings neat and clean for staying healthy" (Girl, Class 8)
3. Indices of health		
Active & energetic	6,7,8,9,10	"Being energetic & active in all classes" (Girl, Class 7)
Ability to work hard	6,8,9,10	"If one is healthy, he/she is able to do anything" (Boy, Class 10)
Playing well	6,7,8	"To be healthy, we should always play games" (Boy, Class 8)
Fit & strong	6,7,8	"Keeping body fit is important to be healthy and do any work" (Girl, Class 7)

inferring the definitions the priorities on aspects (based on the percentage of responses) were also taken into consideration.

Class 6 children defined 'being healthy' mostly in terms of consumption of healthy diet that includes drinking milk and adequate water, being fit and strong, following personal hygiene, practicing yoga and exercise for physical fitness so as to be free of diseases.

Similarly, the children of Class 7 defined 'being healthy' in terms of a nutritious and balanced diet and avoidance of oily food, being fit and strong through exercise, leading to a disease free state indicated by good academic performance.

The children of Class 8 described 'being healthy' in terms of a nutritious and balanced diet, through maintenance of personal as well as environmental hygiene, regular exercise, ability to do any work, being fit and strong, having energy and being active, ability to adapt to situations, maintaining good interpersonal relations, coping well with stress, and maintaining a disease free state.

Class 9 children had a comprehensive definition of 'being healthy' i.e. consumption of nutritious and balanced diet, a state of no disease, sustained through personal and environmental hygiene, and regular exercise and yoga with an outcome of long life.

Children of Class 10 also described being healthy as adherence to nutritious and balanced diet along with observing personal and environmental hygiene, being active in their work, including psychological factors such as mental health, positive affect state, having a peaceful mind, along with behavioural factor such as preventive healthcare.

Table 3 Unique sub-themes under themes, and specimen responses of participants across different classes

Class	Themes and Sub-themes	Sample Responses
6	Ways to be healthy	
	Eating on time	"Eating on time is very good for health" (Girl)
	No over eating	"If we have to stay healthy we should not over eat" (Boy)
	Chewing well	"We should chew food properly, for proper digestion" (Boy)
	Drinking lot of milk	"Drink milk everyday to stay stronger" (Girl)
	Drinking lot of water	"Drinking plenty of water is very important" (Girl)
	Not being fat/not over-weight	"Being fat is dangerous" (Girl)
7	Indices of health	
	No indigestion	"For healthy digestion we should eat good food" (Boy)
	Ways to be healthy	
8	Avoiding oily food	"We should be avoiding oily food because it is bad for our health" (Boy)
	Indices of health	
	Good academic performance	"Studying without any tension and doing well in exams" (Boy)
9	Indices of health	
	Ability to adapt to situations	"If we are healthy, we can adapt to changes nicely" (Boy)
	Maintaining good interpersonal relations	"Interacting well with others can make us have a happy mind" (Boy)
10	Coping well with stress	"If we are healthy we will have the ability to adapt to stress in life" (Boy)
	Indices of health	
	Living longer	"If we are healthy, we can live a long life" (Boy)
10	Indices of health	
	Mental health and positive affect state	"A healthy person is a happy person" (Girl) "Not just being physically strong but being mentally strong is complete health" (Girl)
	Peaceful Mind	"When we are healthy, we have a peaceful mind (Girl)
	Preventive Action	"To be healthy, we have to go for regular health check-ups" (Boy)

It may be observed that though factors like nutrition and balanced diet are common, the classes differed in their emphasis and additional factors.

3.2 Quantitative Analysis

The purpose of quantitative analysis is to compare the conceptual complexity on 'being healthy' across the classes. In order to compare the children from Class 6 to Class 10 on the divergence of responses across the three themes, the percentage of responses of each Class of students across the three themes is presented in Table 4.

The table while presenting the number of responses also presents the mean responses per Class. It is observed from the mean scores that the mean number of responses across themes for Class 10 is 3.22 as against the mean number of total responses ($M = 2.79$). This can be compared with the mean number of responses of 6th

Table 4 Summary of frequency of responses under themes across classes

Class	N	Responses categorized into theme			Total responses	Mean of responses
		Theme1 Meaning of health	Theme2 Ways of being healthy	Theme3 Indices of health		
6	147	79 (21.70%)	169 (46.43%)	116 (31.86%)	364	2.48
7	155	83 (17.93%)	215 (46.43%)	165 (35.64%)	463	2.99
8	157	103 (22.54%)	239 (52.30%)	115 (25.16%)	457	2.91
9	145	114 (30.32%)	203 (54.00%)	59 (15.69%)	376	2.59
10	63	50 (24.63%)	120 (59.11%)	33 (16.26%)	203	3.22
Total	667	429	946	488	1863	2.79

N = Sample size

Class ($M = 2.48$) which is lower than the total mean ($N = 2.79$). The results also reveal that the percentage of responses under theme 2, i.e. *ways of being healthy* increased from 46.43% (Class 6 & 7) to 59.11% (Class 10). This shows that larger percentage of children responded with the antecedent of health. In case of theme 3—*indices of health* the percentage ranged from 15.69% (Class 9) to 31.86% (Class 6). On the contrary, in case of the theme *meaning of health* the responses ranged from 17.93% (class7) to 30.32% (Class 8). This indicates that it is more common among children to conceptualize health in terms of causal action and parameters indicating health than in abstract terms of ‘meaning of health’.

3.2.1 Computation of Entropy to Examine the Extent of Divergence in Response and Class-Wise Conceptualisation

The concept of ‘being healthy’ is subjective. Hence, children may hold different schema of the concept. Higher the variation across themes, higher is the entropy.

In order to meet the objective of examining if the responses across classes showed a progressive developmental trend in perception of health, the frequency of responses under themes were plotted. The convergence or diversity in conceptualisation based on the frequency of responses under different themes was observed by calculating the disorderliness or entropy. The steps of mathematical process of detailed derivation of entropy are explained under [Method](#) section.

Using this process, the derived Response Ratio, Balancing Factor, Absolute and Neutralised Entropy across five classes of students are presented in [Table 5](#). The Neutralised Entropy values are plotted as line graph in [Fig. 1](#).

Both [Table 5](#) and the graph revealed a significant spurt in response divergence between Class 9 ($E_n = 1.969$) to Class 10 ($E_n = 4.373$). Surprisingly, the entropy score at Class 6 was found to be higher ($E_n = 2.074$) with a marginal declining trend thereafter till Class 9. This needs to be interpreted with reference to their curriculum of Biological or Human Sciences across classes.

[Table 5](#) depicts the sample size for each of the classes, along with B_F , i.e. or Balancing Factor which is a correction for class size. The significant highlight of the table is the depiction of divergence or disorderliness of responses, i.e. the

Table 5 Response ratio, balancing factor, absolute and neutralized entropy across five classes of students

Class ($N = 667$)	R	B _F	E	E _n
6 ($n_1 = 147$)	2.476	0.220	0.457	2.074
7 ($n_2 = 155$)	2.987	0.232	0.448	1.928
8 ($n_3 = 157$)	2.911	0.235	0.444	1.886
9 ($n_4 = 145$)	2.593	0.217	0.428	1.969
10 ($n_5 = 63$)	3.222	0.094	0.413	4.373

R, Response ratio; B_F, Balancing Factor; E, Absolute Entropy; E_n, Neutralized Entropy

respondent's tendency to respond variedly in response to the question posed to them, indicated by E_n . In short it refers to the spread of responses of a class across the themes. According to Neutralised Entropy values, there was a slight drop from Class 6 ($E_n = 2.074$) to Class 7 ($E_n = 1.928$), and a slight further reduction in Class 8 ($E_n = 1.886$). This pointed out to an 'unstable stagnancy' in cognition of the respondents belonging to middle school, as the values could not be predicted as drastic changes. For Class 9, there was an increase in Neutralised Entropy scores as compared to Class 8 ($E_n = 1.969$). The surprising element in the observation of this trend was reflected in the radical jump of divergence of health-related schema in the respondents of Class 10 ($E_n = 4.373$). This phenomenon is illustrated in the line graph in Fig. 1. In the figure, it is observed that the developmental trend line was a plateau for Class 6 to Class 9 with an upward steep for Class 10.

Among other computations it is of relevance to note the probability of response by any random child in a class. This is suggested by the Response Ratio (R) value. A randomly selected child of Class 6 was expected to have a schema of 'being healthy' that was expressed in an average of 2.476 meaningful statements. Similarly, 'being healthy' was conceptualised and expressed in an average of 2.987, 2.911, 2.593, 3.222 statements by Class 7, Class 8, Class 9, and class10 respectively. This is different from the entropy value because the explanations may not be divergent in nature cutting across different themes. However, it indicates the ability of the child to explain 'being healthy' in more than one way.

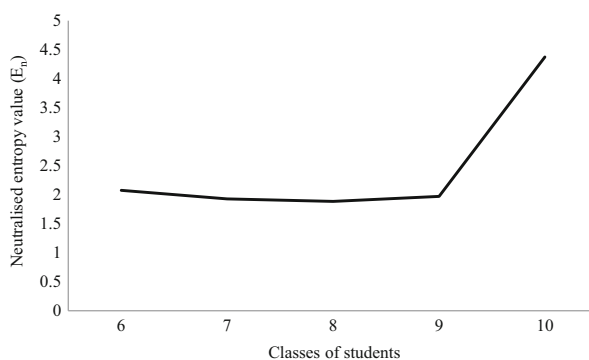


Fig. 1 Line graph plotted with neutralized entropy values showing developmental trend in conceptualization of 'health' among Indian school children ($N = 667$)

4 Discussion

The major findings of the study indicate two broad aspects related to children's concept of being healthy. The first one refers to the thematic concentration and the second relating to developmental trend indicating a progressive increase in the complexity of the concept.

The content analysis and the emergence of the three themes subscribed to and strengthened the qualitative approach. The three themes have indicated that Indian children included the abstract concept of health (meaning of health), behaviour orientation to be healthy (ways to be healthy), and the outcome indices of being healthy (symptoms of health) into their schema of health. This implies that the children conceptualised 'health' in its complexity, close to the holistic definition of health proposed by Bircher (2005).

The three themes evolved out of the responses—*meaning of health*, *ways to be healthy* and *indices of health* have also been included in different independent research findings in the past. The themes being abstract indicate some level of complexity ranging from physical strength and fitness to psychosocial aspects (Almqvist et al. 2006). The low percentage range of response in this theme indicated low level of awareness. This is expected because conceptualizing health in abstract terms is much more difficult than in terms of antecedents and consequents. This finding is in line with that of Motakpalli et al. (2013) that suggested a low awareness of disease and health risk behaviour among rural children in Mangalore, India. However, the difference between Motakpalli et al. (2013) study and the current findings are that the former specifically referred to health risk behaviours and also limited to rural children. Further the method adopted in their study was an assessment of personal hygiene using a scoring system.

The sub-themes listed under the second major theme of 'ways of being healthy' pointed at health promoting and health risk behaviours. The sub-themes such as adherence to balanced diet, food chart, and physical exercise concur with the earlier findings of Protudjer et al. (2010) which stated that children's concept of being healthy referred to healthy eating and physical exercise as significant components. Larger percentage of children's responses across classes falling into this category is also in expected lines since the sub-themes classified under this are related to actions for being healthy.

The biopsychosocial indices of being healthy that were enlisted under the theme of healthy indices corroborated with the earlier findings which indicated that children's concept of being healthy included ability to work, participate in daily activities and attaining the derived goals (Nordenfelt 2007; Schramme 2007; Almqvist et al. 2006). The percentage range of responses under this theme was also found to be relatively lower compared to '*ways of being healthy*'. Such percentage variations across the themes suggest that the level of awareness indicated by any tool is dependent on the type of question. Thus it contributes to the argument that using an open-ended question to measure awareness avoids such limitations in measurement that is imparted by the type of question.

The commonality of themes and sub-themes suggest the most popular ideas about health that are prevalent across classes. Children's most popular beliefs were limited to the biomedical aspect of health, i.e. absence of disease. Similar polarization of the

concept of health by children has been reported in various studies (Piko and Bak 2006; Myant and Williams 2005). Other common concepts of health circled around good diet, hygiene, and rejuvenating sleep which signified the children's positive attitude towards basic actions to maintain good health. Observable characteristics such as being active and energetic, and ability to do any work as the indicators of health were identified by all the classes. However, younger children from lower classes focused on indicators like playing, being fit and strong, and academic performance indicating the simplicity in understanding of health as related to their own day to day activities. The overall picture about the commonality of themes and sub-themes shows the concrete qualities children understand about health. Abstract yet important features of health such as good mental health, psychosocial factors such as social relationships seem to be absent across the classes. The unique sub-themes interestingly bring out the progression in the comprehension of health in the children as their exclusivity in defining health shifts from '*ways to be healthy*' to markers of good health. This can be interpreted as the shift in their cognition from merely remembering and following instructions about how to maintain good health (probably from their caregivers, teachers, or curriculum) to self observation of markers or indices of good health which also includes psychosocial aspects (maintaining good interpersonal relationships, having a peaceful mind, good mental health and positive affect, etc.) as they move higher up the classes.

Another of the contributions of this study is measuring the concept of health with its complexity. Computation of 'entropy' across the classes enabled the investigators to measure the degree of complexity in the schema of health as held by children. Rather than merely counting the number of responses, the concepts that spread across the themes indicated by higher values of entropy projects the complexity of the schema, which in turn is an assessment of presence or absence of a developmental trend in conceptualizing health. The results though indicated a developmental trend, it almost showed a plateau between Class 7 and 9 and then onwards a steep upward slope. Similarly in a study of children's concept of diabetes there was spurt in conceptual knowledge of diabetes for Class 10 (Padhy et al. 2018). However in conceptualizing HIV/AIDS, there was a gradual increase in the neutralised entropy from Class 6 to Class 8 and then a sudden jump from Class 9 to Class 11 (Nagpal et al. 2017).

The developmental trend was found to be somewhat erratic. The findings that indicated a relatively higher entropy score at Class 6 which showed a slight downward slope at Class 7 and 8 followed by a negligible pick up in Class 9 which then showed a significant sudden upward slope between Class 9 and Class 10 needs to be interpreted in relation to the curricular inputs. With these objectives the textbooks of Biological Science followed by these schools were examined. The contents related to health were searched. This exploration revealed that Biological Sciences are taught as a distinct course only from Class 8. In Class 6 the science text in the very first chapter explains the "dos and don'ts" of the food consumed. There is no focus on health in the science text of Class 7. Though there is a focus on 'illness and avoidance of health risk behaviour' in Class 8, that is listed as the last chapter which was not yet covered at the time of data collection. Again in Class 9 the focus of science curriculum was on plant sciences than on human health. However, the Biological Sciences in Class 10 have a wide range of chapters focusing on health. Thus, the entropy line seems to correlate with the school curriculum.

In the light of the present findings it can be inferred that children in this study had a complex concept of health and involved a cognition that includes abstraction such as ‘God’s gift’ to concrete actions as well as the consequences of being healthy. This can be further strengthened and enhanced with a curriculum that is more systematically organized along the stages of cognitive development. The concept of entropy may be useful for the researchers who adopt quantitative content analysis for understanding the divergence of response pattern.

4.1 Limitation and Conclusion

Despite its high utility in comprehension of children’s perception of *health*, this study is limited to a particular academic curriculum of schools and students belonging to the lower socioeconomic group. A comparison of this group with the children from higher socioeconomic status and following a different curriculum would have given an insight whether the conceptual complexity is related to SES and school curriculum. Also, there should be further opportunity for children to clarify their answers and follow-up.

Nevertheless, the Indian school children are found to perceive health in multi-dimensional terms organised around its meaning, health promoting or risk behaviours, and indices of health. A developmental variation in children’s operationalisation of the dimensions of health is mostly attributed to exposure of health curriculum taught in their schools. This study paves a future direction of research to design the school science curriculum to promote better conceptualisation of perception of health and subsequent risky or healthy behaviour, so as to enhance health promoting behaviours in children.

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Compliance with Ethical Standards

Conflict of Interest Nil

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Family Support in Effective Management of Hypertension: Role of Children as Passive Change Agents

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ABSTRACT

Physical health is a field which requires holistic intervention to manoeuvre individuals towards better health outcomes through promotion of health enhancing behaviour. Family support has been established as an important protective factor in any health behaviour change. However, the role of children has not been directly referred to in family health promotion. Among significant areas of concern in the field of health, non-communicable diseases have a steep rise, among which hypertension has highest prevalence and is also responsible for the alarming rate of cardiovascular morbidity projected to increase upto 44% by the year 2035 globally and in India. Involvement of children in shaping health should become a fundamental tradition because of their dual roles. Firstly, they have a responsibility as victims of the same clusters of lifestyle habits as their family members, and secondly, with their potential to influence attitudinal shift of health risk behaviours in their family members. This paper entails a comprehensive systematic literature review in light of the role of children as change agents throwing light in effective management of hypertension. Children's agency in terms of their potential, their ability, and discredit is thoroughly discussed. Scientific articles have been reported to substantiate children's influence in their family to bring out changes in health behaviour. Evidence suggest the feasibility of utilizing children as change agents to partially fill the increasing gap between supply and demand for health change behaviour needed to enhance the productivity of children as change agents is listed. Implications of study are also discussed.

Keywords: children, change agents, primary prevention, hypertension management, health promotion

INTRODUCTION

Behaviour is unique to every individual. There has always been an interest in steering behaviour towards constructive and positive outcomes. A positive behavioural change could be comprehended as a desirable shift in attitude, cognition, and affect from the less desirable response to any stimuli. Change is stimulated through various change agents employed by enthusiasts of the desired change. In other words, there are several change agents such as media, government

policies, police, authority figures, teachers, parents, interpersonal relationships, and even the self. Agents of change formulate approaches or strategies to intervene and bring about attitudinal change subsequently affecting behaviour of an individual. The aim of change agents is to support and equip persons to adopt change in behaviour to drive towards desirable individual transactions. Relationship motivation theory by Deci & Ryan, ^[1] and Organismic Integration theory by Moss ^[2] as explained under self-determination theory discusses

the factor of relatedness and autonomy in interpersonal relationships which facilitate motivated changes in health behaviour. Similarly, Bandura's ^[3] social cognitive theory has also stressed on the influence of external stimuli and social factors in behavioural intentions and behavioural change.

Physical health is one such field which is gaining a lot of attention from all health interventionists-clinicians, researchers, health psychologists, media- to maneuver individuals towards better health outcomes through promotion of health-enhancing behaviour. To bring about a change, it is necessary to comprehend and subsequently modify causal factors of health-debilitating behaviour. Probably the cause behind poor health management is the inertia caused due to external attributions made by the individual (Kelley ^[4]). The high prevalence of the health-risk behaviour unfortunately leads to high consensus; development of norms (smoking, unhealthy diet, lack of sleep, etc.) posing risks to health automatically lowers the distinctiveness; along with heightened complacency over the course of time causing high consistency in health risk behaviour. Self-management is the key to good health (Grady & Gough ^[5]), which is triggered through positive attitude and appraisal of declining health condition. The need is to translate the positive attitude into a practice and action system, also known as self-care (Barlow, Wright, Sheasby, et al ^[6]). It is important to note that self-care occurs in a contextual space and not in isolation (Gallant ^[7]). Self-care requires the support of health care providers, community members, friends, and primarily family members (Rosland et al; Rosland, Heisler, Choi, et al ^[8,9]). It is conjectural to say that involvement of family members may prove to be either facilitating or impeding. According to systems theory, change in lifestyle of one component, i.e. change in at least one family member's habits or health behaviour, brings about a change in lifestyle for other family members (Ryan & Sawin

^[10]). If the change in health behaviour is positive, it could be a beneficial choice of lifestyle for other family members. However, a few qualitative studies have pointed out the negative effects of familial support during illness. Individuals with a sense of autonomy and an internal locus of control suffering with chronic illness feel guilty of burdening other family members in aspects of psychosocial care provided to them, and may often be criticised or badgered about the strict discipline required to deal with the disease (Carter-Edwards, Skelly, Cagle, et al; Sandberg, Trief, Greenberg, et al ^[11,12]). Family members may also hinder patient health outcome or become a barrier in their management (Gallant, Spitze, & Prohaska ^[13]) as they may not like to follow the same diet, or may cause embarrassment about self care, or may make more demand for their time than they can make do of their role in their family.

Though there is no direct reference to the role of children in the family, children are important members of family thus causing a need to inquire their role in family health promotion. There is a paucity of research in the area of health to explore the dynamic role of children in their family. Involvement of children in shaping health should become a fundamental tradition because of their dual roles- their responsibility as victims of the same clusters of lifestyle habits as their family member(s), and their potential to influence attitudinal shift of health risk behaviours in their family members. The United Nations Conventions on the Rights of children furthermore recognizes that children should be accepted, acknowledged, and encouraged to participate in decisions concerning their lives (Skelton ^[14]). Alderson ^[15] described children as influential means of change, as they are involved in daily life activities of which all children and youth are a part of in some way. Assuming the reciprocal power to exert influence, referred to as "circular causal process" (Olson & Cromwell ^[16]) it is deemed to be a relationship between the

perception of the child's own influence on the parents; and the perception of parents about the influence of the child, although it will not be identical (French, Cartwright, & Raven^[17]).

This paper entails a comprehensive systematic literature review of the role of children as change agents in healthcare, especially in the case of management of hypertension and cardiovascular disease. As a purview, research studies from diverse fields have been reviewed and children's influence in several contexts is used to emphasize upon their agency. Strings used to search for research papers were- "children as agents of change", "children as health change agents", "cardiovascular health AND children as change agents", "hypertension AND children as change agents". Snowball referencing was also used as adjoining search for suitable articles. No limit was specified for the years searched, hence, certain long-standing references have also been made to justify certain viewpoints to strengthen the connotation of children's agency.

Can children be good agents of change in general?

There are several reasons for focussing on children to enable change. Firstly, attitudes formed at an early age will be stable, enduring changes through adulthood (Asunta^[18]) thus securing positive desired behaviour for subsequent generations. Secondly, the opinion and discern of children is highly rated by their parents (Thornton, Shaw, & Williams^[19]). There has also been a progressive body of literature appreciating the bi-directionality of relationships between children and adults (Ambert; Kuczynski, Harach, & Bernardini; Knafo & Galansky^[20-22]).

Research done in consumer behaviour has found that children influence their caregivers' decision in purchasing, and markets often use this to strategy to promote grocery items (Powell, Langlands, & Dodd; Wilson & Wood^[23, 24]). A study done by

Hunter^[25] reported that children influenced 80% of parents' decisions, and was indicated through a 54% rise in parental spending. Ryan^[26] also notes that satisfying the children generates a sense of gratification in the parents. Marketing studies have also accounted that nagging and requesting for specific items was one of the direct methods of children to influence purchasing by the parents who bought it despite the food item being unhealthy (Henry & Borzekowski; Maubach, Hoek, & McCreanor; O'Dougherty, Story, & Stang^[27-29]). A qualitative public health survey highlighted that when parents shop with their children, they tend to forego important health related information such as reading nutrition labels in order to avoid the hassles of dealing with children's demands (Maubach, Hoek, & McCreanor^[28]). The emphasis of these studies should be the type of interactions between the parent and the child, independent of the context, and the shift in contention of parents regarding their children's view.

Children's role in sharing knowledge with their parents or adults in the family has been explored in a handful of studies. Children have been seen to have an affirmative impact on their parent, guardian, or another significant adult by dissipating issues requiring awareness (Saphir & Chaffee; McDevitt & Chaffee^[30, 31]). Ronan and Johnston^[32] identified a school programme which was an effective format emphasising upon the interaction and homework to be completed with parents and guardians in order to increase levels of family disaster preparedness.

Children as effective agents in the context of health and hygiene

This idea is replicated by research studies such as one prospective, quasi-experimental study in Kenya revealed that health education provided to children on various disease conditions improved the home and school environment and found the children to have better modified behaviour than the parents, who also had improved

knowledge about the diseases (Onyango-Ouma, Aagard-Hansen, & Jensen [33]). Studies in different areas (Damerell, Howe, & Milner-Gulland; Vaughan, Gack, Soloranzo, & Ray [34, 35]) have proved that there is inter-generational transfer of knowledge from child to parent.

Along the lines of this perspective, Christensen [36] has saliently remarked: *“For the child to develop independent agency in relation to their own (and others) health and well-being the key aspects suggested are: self care (physically, emotionally and socially), personal care and hygiene, keeping fit and active (physically and mentally), developing and maintaining connections (including relations of care, responsibility and obligation) with parents and peers, balancing and managing everyday risks, developing knowledge and health-related skills and competencies, developing positive values and meaningful goals for own health, well being and health behaviours, and the ability to consult and use health care services.”*

Considering the agency of children in an encouraging light, it should be a prerogative to target children as change agents of health. As a part of the initiative for hygiene interventions in a rural town of Zambia, qualitative research revealed that pupils were able to catalyze changes in health behaviour of hand washing through construction of hand washing stations at home and its implementation through and in their family members (Bresee, Caruso, Sales, et al [37]). There have been other instances where children learn about water usage, sanitation and health risks at school and pass this information onto their friends, parents and the wider community (Gibbs, Mann, & Mathers [38]). Yet another participatory educational approach (Mwanga, Jensen, Magnussen, et al [39]) in Tanzania showed that school children actively pursued their role as health change agents and challenged conventional African views of power, status, and wisdom usually associated with old age. There were a few barriers that were identified in the

educational approach like programme of study, time limitation, class size, teaching materials, and working conditions.

Other school-based interventions were effective in educating children and adults of their family in terms of increased physical activity (Rhodes & Lim [40]), reduced salt intake and lower blood pressure among adults of their family (He, Wu, Ma et al [41]). An intervention for Sri Lankan students (Yuasa, Shirayama, Kigawa, et al [42]) accomplished improving the parents' behaviours regarding dietary patterns, hygiene maintenance, lifestyle habits, and physical exercise. The adults reported a direct and indirect shift in their attitudes and awareness which resulted in improved health quality. This study stressed that for better and effective health intervention programs children should be motivated to spread health knowledge after it is provided to them.

Can all children be change agents?

A rational concern emerges at this point, i.e. can we depend on children's opinions? The answer lies within the child, who is being socialized through external agents in the environment. An Indian study which focused on the agency of children as peer educators for ear health established through an experimental method that children are as effective and reliable as adults in dissipating message of health and hygiene (Sonavane, Deepthi, Rodrigues, et al [43]). Children also have an autonomous and independent way of life in their formative years since in most families both parents are working individuals (Dotson & Hyatt [44]). As a positive appraisal of this context, Golombek [45] has added that children in order to be agents of change require to incorporate the 5 C's- character, confidence, connection, competence, and contribution. Molloy, White, and Hosfield [46] have distinguished the benefits and obstacles of the participation of youth and children as change agents. A few of the motivational benefits as stated were the beliefs related to the increased regard for

themselves for being able to express their views, and to be considered in any decision making process. Involving children would enhance their confidence to make a difference stimulating them to explore more ways of participation and simultaneously develop background knowledge, comprehend emulation of an adult, and boost self-confidence. Children also tend to be less prejudiced by indoctrination, religious beliefs, and fatalistic beliefs (Pilgrim ^[47]).

Few inhibiting factors as studied were- importance of other priorities, scepticism about efficacy of participation, shifting of the responsibility to adults or paid individuals in charge of the job, lack of awareness, involvement, self-confidence, knowledge, and negative peer group influences. Iyengar and Jackman ^[48] also listed the presumptions of adults concerning child influence. Adults believe that children lack in commitment, are self-absorbed, undisciplined, and are not interested in long term plans. They also feel that children are temperamental, inexperienced, and interested only in fun.

A child is exposed to unprecedented technological environment - television, print, media, for an average of 5.5 hours per day (Dotson and Hyatt; Singer, Singer, D'Agostino, et al ^[49, 50]). This kind of contact with the external world has made the children more knowledgeable than their parent (Francisco ^[51]). So the ratio of children's input to parents' is compatible with retrieved information from external socialization agents. Iyengar and Jackman ^[48] have contradicted this viewpoint and stated that there is an overrepresentation of children as media and internet users, as a large section is uneven in terms of technological knowledge.

Another factor in the reliability of children's influence is their unique and dominant position because of the new family structures- single parenting, co-habitation, longer wait for marriage, and delayed childbirth- which collectively suggest the different decision-making

environment, where their position has increased to an active decision maker in the family (Flurry ^[52]). Labrecque and Ricard ^[53] found that children from non-traditional family demonstrated larger influence. There are families where the child plays the role of a translator-mediating change and passing information. It is a useful mediatory process where the child passes on information to the parents or grandparents in a language easily understood by them (Mitchell, Tanner, & Haynes ^[54]). This is especially valuable in poor and marginalised households where the children's literacy level is more than the adults. Children were also reported to have been closer and confiding in their mothers about their views and concerns, and believed that mothers would pass on the information to the fathers if they found it important. This view was endorsed by mothers who unanimously agreed that their children would turn to their mothers more than anyone else when they had issues and problems (Mitchell et al ^[54]). An intervention study on hygiene, contrarily, found more personal interaction with the fathers-the heads of the family- to help with the implementation of the sanitation and hygiene facilitating construction (Bresee et al ^[37]). However, it is imperative to acknowledge that not all children in vulnerable societies live in a 'perfect' family environment, implying that interpersonal relationship may be dissimilar for each family.

Need for out of box thinking in enhancing adherence in cardiovascular diseases

Among other significant areas of concern regarding health which include hygiene, sanitation, obesity, lifestyle factors, and non-communicable diseases, the spotlight must be on one of the most globally prevalent and fatal disease-atherosclerotic cardiovascular disease (CVD). According to World Health Report by WHO, ^[55] the largest cause of death and disability in India by 2020 will be due to CVD. High blood pressure or hypertension is the most directly attributable cause of CVD, and is a significant health burden on

the health care system (Leeder, Raymond, Greenberg, et al; Reddy, Shah, Varghese, et al [56, 57]). The scenario in India suggests that 57% of all stroke deaths and 24% of all coronary heart disease (CHD) deaths in India can be blamed on hypertension (Gupta [58]). High prevalence of this dangerous risk factor is primarily due to the shift in lifestyle and urbanisation in India. The biggest challenge for poor blood pressure control in the hypertensive population is because a large section of people are not aware of the symptoms or the severity of the disease (Wang, Kong, Ma, et al [59]), and hence do not pursue self-management in terms of medical help, behavioural change, and emotional regulation (Corbin & Strauss [60]). In India more than half of the hypertensive population are not remotely aware of their elevated blood pressure, and among those who are aware only 60-80% of the individuals are treated with medication, and even they do not address all the risk factors completely (Devi et al; Gupta and Yusuf [61,62]). Surprisingly, only a small percentage (10-15%) of Indian people with hypertension has their blood pressure under control through systematic management. Socioeconomic conditions (Gupta & Gupta; Subramanian, Corsi, Subramanyam et al [63,64]), comorbidity such as hyperglycaemia (Hanover [65]) and quality of healthcare services provided (Wee & Koh [66]) are certain parameters which also decide the facilitation of management of hypertension, and are not modifiable with ease. India is racing in cardiovascular deaths at least a decade faster (decline of 60% in the US compared to a 300% growth in India) and younger than their counterparts in other countries (52% deaths in India compared to 23% deaths in other developed countries, under the age of 70). Preventive lifestyle modification is the best battle that is to be fought that could secure the harsh realities of cardiovascular health in India.

A child as a part of the initiative to manage hypertension is not simply an alternative approach. It is a mandatory need as identification of risk factors of

hypertension begins as early as childhood and adolescence, making them concurrently vulnerable to the disease across the domains of behavioural, environmental, genetic, and physiologic endowments of their lifestyle shared with their family (For, E. P. O. I. G., & Children, R. R. I.; Gupta et. al; Patil & Garg, [67-69]), and also tracking of their adult CVD health status. This is supported through a research finding centred on the need to lower cardiovascular disease which was conducted in school children to screen for cardiovascular risk (Berenson, Srinivasan, Bao, et al; Barker & Hanson; Barker [70-72]). The findings successfully predicted risk in their parents and there was a significant association in lifestyle and cardiovascular risk between parents and children (Schwandt, Bischoff-Ferrari, Staehelin, et al; Haas, Liepold, & Schwandt [73, 74]). An Indian study (De, Mookerjee, Guha, et al [75]) conducted to capture the prevalence and sustained elevation of blood pressure in children documented that 37 out of a sample of 289 children between the age of 5 and 15 years had primary hypertension as per definition. Out of the diagnosed 37 children, 24 of them had a family history of hypertension. Another Indian study by Patil, Patil and Patil [76] reported similar phenomenon of occurrence of hypertension in their sample of children between the age group of 13 to 15 years.

Use of children as change agents in cardiovascular diseases

Recent research has highlighted the upward trend in prevalence of hypertension from 0.5% to 11.7% between 6 to 18 years of age who suffered from primary hypertension (Roy & Ghosh [77]). Obesity was found as one of the risk factors. Further, the projections show that by year 2035, 45.1% of the population globally (Khavjou, Phelps, & Leib [78]) and 44% of Indian population (Gupta, Gaur, & Ram [79]) will suffer from primary hypertension. Such statistical data should invoke the wisdom of methods of handling the contemporary problems of childhood hypertension and future problems of enhanced prevalence.

This is possible by educating the children of contemporary issues. This attacks both problems in one shot because the cognitive base created in children enables those diagnosed with hypertension to handle it effectively, and the others to take measures for preventing now as well as the future when they constitute the adult population for which the projections are given. The third advantage will be in influencing the adults in their families for total adherence. Banerjee [80] from Pune, India reported that more than half (61.16%) students of 9th and 10th standard considered reduced physical activity as a risk factor for cardiovascular disease. Their knowledge regarding other risk factors was even lesser than this proportion. These findings are a vital tool in comprehending health awareness in children because healthy practice reflects associated sound knowledge of health state.

To actively enable children in preventive health care, it is important to gauge the knowledge level of children. A study conducted by Hariharan, Andrew, Kallearapu, et al [81] using mixed methods studied the conceptual basis of hypertension in 776 students of 6th to 12th standard, where in general the children's understanding was found to be inadequate, and 22.57% of responses indicated misconceptions. Another baseline assessment of CVD related health awareness conducted through a survey of 2995 ninth and tenth grade students in the rural district of West Midnapore, India (Ray, Guha, Ray, et al [82]) showed that students scored less than 50% which enlightens the incomplete knowledge possessed by children. Cardiovascular risk factors were studied and related knowledge level was assessed in 485 school children of Delhi in India (George, Sharma, Ramakrishnan, et al [83]). Of the total, a meager quarter of the children had sufficient knowledge related to cardiovascular risk factors. This is peculiar as one-fifth of the students had a family history of cardiovascular disease. In fact, hypertension was already a morbid occurrence in the children where 6.8% were diagnosed of

stage 1 hypertension and 1.4% of stage 2 hypertension. Of all, 12.4% of the children lingered in the pre-hypertension stage. An assessment of other risk factors revealed that only about half of the pupils were physically active for a minimum of 1 hour everyday (as recorded of the previous week of the assessment) and only 42% of the children consumed fruits and 76% of the children consumed vegetables. It was also found that 11.5% were overweight and 9.5% of the children were obese (another vital risk factor of hypertension). Although a very small percentage of children reported the consumption of tobacco, it remains an important statistic to note which highlights that children as young as 11 years are exposed to the risk of smoking- a contributor of the morbid disease.

Lifestyle Education Intervention

Along the same lines, children have also helped to dissipate awareness of lifestyle risk factors. A health education program that engaged school children to act as change agents for promotion of a healthy lifestyle of their mothers was conducted in a Sri Lankan school following a 12 month cluster randomized trial in 8th grade students and their mothers. The program proved to be effective in employing children as change agents of family's lifestyle which was observed through weight reduction and increase in physical activity of their mothers (Gunawardena, Kurotani, Indrawansa, et al [84]). A school health education program in Sousse, Tunisia (Harrabi, Maatoug, Gaha, et al [85]) also showed a significant improvement in children through a year of intervention incorporating educative activities pertaining to usage of tobacco, need for physical activity, and consumption of healthy diet. Towards the final stage of intervention, more children adopted the habit of walking to and from school and practicing sport. This is especially valuable in the light that obesity is also a risk factor of hypertension which may or may not be symptomatic in childhood in addition. The risk is higher if there is a positive family history of hypertension and/or CVD

(Falkner ^[86]).

Hypertension & CVD Knowledge Intervention to children as the preliminary step

Reducing the risk factors of hypertension in any phase of life including childhood and adolescence would inevitably delay progression towards clinical cardiovascular disease and improve overall prognosis in the long term (Raj ^[87]). Starting from early childhood and implemented in school and familial settings, a few interventions centred on the need to reduce risk of CVD and efficiently manage hypertension have been conducted.

Ray et al ^[82] provided a simple and cost-effective intervention in West Midnapore, India, after a baseline assessment of the 2995 ninth and tenth standard students' knowledge across six domains of CVD health (concept, prevalence, risk factors, role of healthy lifestyle practices, multidisciplinary approach, and benefits of the approach). The intervention seemed to have a modest improvement in cardiovascular related knowledge. Importantly, children learned of their ability to modify cardiovascular health through simple lifestyle changes.

A Prevention Education Program (PEP) (Schwandt, Geiß, Ritter, et al ^[88]) in Nuremberg, Germany was successful at reducing cardiovascular risk factors in adults and children. The program was conducted for a period of 10 years which included regular home visits, health education, and group sessions. Another prospective randomized community based study aimed at school going children aged between 6 and 10 years to reduce cardiovascular risk in their parents was conducted in Brazil for a period of one year by Fornari, Giuliano, Azevedo, et al. ^[89] It compared intervention provided to their control group (written educational material) and experimental group (multidisciplinary-weekly educational programme along with written educational material). Post intervention, there was a significant

reduction in cardiovascular risk for all the parents in the experimental group. Those disposed to cardiovascular disease in the experimental group also had a much higher reduction (91%) than the predisposed cardiovascular risk parents in the control group. These studies draw attention to the information that if children are educated via the correct medium and are equipped with full knowledge, they can help in curbing the risk associated with deadly diseases such as CVD.

CONCLUSION

Cumulative research evidence exemplify children's active role as responsible citizens concerned with the wellbeing of their community, and suggest that there is considerable potential for children's and young people's voices to act as agents of change. As agents, children are capable of applying strategies and drive situations in their favour as well as adjust with available resources and limitations. Nonetheless, there are a few methodological issues that raise issues about demonstration of influence of children on parents. It is extremely difficult to attribute unique variance as children and parents have too many commonalities between them (Harris; Maccoby & Martin ^[90, 91]). Moreover, research in this area is young and limited, and it is difficult to distinguish the influence of a third party or external media. The research is only limited to the influence of children on parental behaviour, whereas beliefs, values, and attitudes are untouched area. Knafo and Galansky ^[22] noted that "if children *can* influence the values of their parents does not prove that they *do* influence their parents. More evidence is needed from naturally occurring adult-child interactions as well." The presence of more than one sibling may have contradictory or additive influence on the parent. In light of existing methodological flaws, Kumar, Ray, Mahapatra, et al ^[92] have described an elaborate intervention protocol- the CRRIS study protocol to reduce cardiovascular risk in school students. Although difficult to

implement and lacking a holistic perspective, it carves a pathway for researchers to formulate and conduct intervention studies for school children and harness health enhancing behaviour in children and their caregivers.

The under-researched area opens a wide arena to supplementary motivating questions which would help understand the influence of children on parents, in depth. Firstly, it is important to understand the characteristics of children that may affect parents. Likewise, the characteristics of parents that influence children must also be explored. Secondly, the domains where influence would be acceptable bi-directionally are yet to be analysed. There are several more gaps in this field which needs to be understood to enable children as leverage to positive changes.

A *narrative synthesis* of 9 studies that met the inclusion criteria, were evaluated based on outcome of the intervention to establish the catalytic process of children in dissipating information and establishing themselves as effective change agents. An Indian study conducted by Sonavane, Deepthi, Rodrigues, et al [43] on 212 students who were educated about ear health proved to be successful dissipaters of knowledge to other children proving to be effective agents of health. In another study by Kamo, Carlson, Brennan, et al, [93] children aged between 10 - 14 years were successful in strengthening community approaches toward reducing the risks and stigma of HIV/AIDS. School based interventions for transference of knowledge have also been seen to be successful. The potential effectiveness of 363 students was also studied (O'Reilly et al [94]) in grades 4–8, which was assessed in terms of parents' awareness of correct 'WaterGuard' use to reduce chlorine residual in stored water as taught to them by their children. Parents who reported that their children influenced their water treatment behaviour had a higher degree of awareness than those who reported no influence. Additionally, 25% of parents

reported changing their handwashing behaviour based on what their child taught them, and 38% were able to demonstrate the handwashing procedure taught to their children representing fairly high awareness of the correct technique. Results also suggested that membership of safe water clubs may have enhanced children's role as agents of change. In other community based study in Lao, PDR by Nonaka, Kobayashi, Jimba, et al, [95] participants were 130 school children in grades 3–5 at two primary schools who demonstrated themselves as successful health information messengers for malaria control, after an intervention was given to them for a duration of 1 month. Another evidence was acquired from the report of Simovska and Carlsson, [96] who guided 2300 children (4–16 years) in 73 schools in both school and community level policy making provisions and affordances regarding healthier diet, regular physical activity establishing them as successful health promoting changes agents. A qualitative study of a food intervention in a primary school by Ensaff, Canavon, Crawford, et al [97] reported that when intervention which was in the form of semi-structured focus group discussions (76 7–9 year old pupils, 16 parents) and interviews (with head-teachers, catering managers and specialist staff) promoted pupils' greater food awareness, appreciation and skills, and pupils acted as agents of change, influencing cooking and food choice at home. These short term outcomes have the potential to lead to longer term outcomes including changing eating behaviour and diet. Out of 25, 6 children were found to be acting as change agents between 6 and 13 years of age for adult food and physical activity behaviours in American Indian households in the Upper Midwestern United States (Gadhoke, Christiansen, Swartz, et al [98]). In view of community development too, such as for Palestinian refugee camps 10–14 year Palestinian refugee children who lived in the camp learned skills from the project and reported feeling empowered and being able to make a change in their own

development and their communities. This was corroborated with other groups involved who confirmed the powerful agency of children (Makhoul, Alameddine, & Afifi, [99]). In terms of environmental practices, it was accounted that there was a spillover of environmental education practices inculcated for children over to family members (Hiramatsu, Kurisu, Nakamura, et al [100]). One qualitative research was doubtful of the capacities of children in energy saving message. In French-speaking Belgium in 2007-2008; data were gathered in 13 families whose elder child is 10 or 11 years old by Bartiaux. [101] Results indicate that the child is neither powerful nor passive, nor a trustful carrier of energy-related 'good' practices. However, the sample size of this report does not seem sufficient to base general conclusions for children's potential to be change agents.

The dissipation of health education is seen as the most effective front with children being agents of change. There is also evidence that in pluralistic medical settings children engage in self-treatment of their everyday illness episodes, thus becoming more or less autonomous health agents (Geissler, Nokes, Prince, et al [102]). Also, school-based programmes are an ideal setting and student friendly (Harrabi et al [85]) facilitating peer education as well. The need for policy making and inclusion of awareness about diseases and its risk factors as a part of school health education programs is also stressed upon by Mendis [103] in her editorial letter in the *Indian Heart Journal*.

Furthermore, the potential of children as health agents should be seen in the context of their social environments (e.g., school and home). Children as social actors are surrounded in larger societal framework, which includes power and knowledge hierarchies. These may enable or constrain their ability to act as change agents (James & Prout; Onyango-Ouma [104, 105]). Developing countries such as India are most vulnerable to the risks of grave non

communicable diseases due to its competitive pace and lack of awareness of health risks. It must be a collective effort to control the epidemic of non communicable diseases. In India, over 200 million children go to school and therefore can become wide range communicators of health when equipped with the right knowledge through school education programs. Curriculum designing in this line would go a long way in the application of skills in the area of health as well as constituting a strong public awareness programme that targets adolescents. This would be a long term investment in safeguarding health of the children themselves and adults, ensuring economic, social and personal security and wellbeing. As suggested by the review, comprehensive health education interventions need to be planned and implemented. For this to be fulfilled, research needs to be conducted to test the efficacy, durability, comprehension and impact of health intervention models for children. Such research is likely to have positive implications in the area of health, school education, and child development.

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Improving Work Performance: Examining the Role of Mindfulness and Perceived Control of Internal States in Work Engagement

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Abstract

Introduction: Organizations are in constant endeavor to find ways to enhance their employees' productivity and efficiency. In this context, the present study attempted to examine if mindfulness and perceived control of internal states along with major demographic variables act as indicators of work engagement in front-liner employees.

Method: In this survey, 180 front-liners who were selected through purposive sampling from five private organizations participated. The Cognitive and Affective Mindfulness Scale-Revised, Perceived Control of Internal States Scale, and Utrecht Work Engagement Scale were administered. The obtained quantitative data were analyzed in terms of descriptive statistics, Pearson's *r*, and multiple hierarchical regression analysis.

Results: Findings revealed that out of the six predictors under study, five predictors—mindfulness, perceived control of internal states along with three demographic variables (age, marital status, and years of service)—were found to significantly correlate with employees work engagement.

Conclusion: It was observed that mindfulness was a significant predictor when it was considered solely as an indicator of work engagement. Nevertheless when other predictors were considered, perceived control of internal states was found to be a dominant indicator of work engagement across the models. The shortcomings, future directions, and implications were also discussed.

Keywords: Mindfulness, Perceived Control of Internal State, Work Engagement, Organization, Front-line Employees

Introduction

The demands of the fast-paced and competitive developing economy create an adverse psychological impact on the workforce. Work related stress especially to yield higher productivity makes the working class susceptible to burnout, alienation, disharmony in work and life, and shrinkage of psychological capital [1]. Organizations are in constant endeavor to find ways to increase their employees' productivity and efficiency. Work engagement is one such popular emerging parameter to observe an employee's optimal functioning. To achieve a productive outcome, employees must be constantly brushing their cognitive processing to maintain best possible internal state of emotions, thoughts, physical reactions, etc. The fluency of the cognitive processes requires sharp "wakefulness" to mental and external stimuli as opposed to blunt or restricted internal and external awareness of self. Mindfulness naturally occurs (without any training) in every being but in varying capacities of awareness and attention, making it a prerogative to assess its influence on the organizational output capacity through its alteration of the mental state.

Mindfulness is a naturally occurring psychological characteristic; a proactive cognitive process putting the individual in a state of heightened consciousness—a focused state of awareness and attention to particular stimuli among a sea of potentially arousing activities [2]. It is well explained using the self-determination theory [3] which describes the

functioning of mindfulness in two ways: directly—by amplifying attention; and indirectly—by increasing awareness of internal psychological processes. Nurturing these pathways simultaneously generates higher levels of authentic functioning, i.e. a sense of true feeling towards oneself [4].

Perceived control of internal states [5] is an individual's 'primary control' over their internal states, and a perceived ability to be able to minimize the impact of adversities and its effect on their emotions, thoughts, and well-being. It is the individual's self-appraisal of the ability to exert control or the belief that one can influence victory over outcomes and avoid unwanted ones [6]. It is a blend of internal locus of control (attributional belief that outcomes depend on personal actions) and self-efficacy (confidence in self to execute an action to achieve desired outcome).

Work engagement connotes mental exuberance, understood best in terms of "high work involvement, work enjoyment, and low drive" [7]. By the implication of positive involvement, the phrase 'work engagement' stands out distinctively as a counterpart of burnout syndrome and workaholism. Work engagement has been conceptualized as "a positive psychological and motivational state of mind that includes a genuine willingness to put effort in one's work and towards organizational success" [8-10].

Engaging positively in one's own work is a precursor to employee well-being [7]. High levels of mindfulness helps to bring about an optimum level of engagement through less over-engagement such as worrying, over-thinking and over-generalizations of events; as well as less under-engagement such as thought suppression and experiential avoidance [2, 11, 12]. Mindfulness facilitates re-perception of any experience through a non-judgemental attention towards internal experiences [13] thereby hinting towards a shift in the level of perceived control of internal states. Studies have also found a great overlap between the concepts of mindfulness and internal state awareness [14, 15]. It helps to add clarity and vividness in any experience through the process of thought-action fusion and increasing real time experience of emotions [16]. Mindfulness has been effectively used with workers and managers and was seen to be associated with decreased burnout, enhanced creativity and reduced accidents in the workplace [17]. It was found from a study that perceived control had improved most for the group practicing mindfulness meditation [18], and that locus of control and work autonomy has a moderating effect between organizational support and affective commitment [19].

Individuals with high perceived control believe that there is an active association between their internal state and the outcome of their actions. It helps them look for alternatives for reachable goals and disengaging from impractical goals [6]. High level of perceived control of internal states lowers physical and psychological strain [5] thus equipping individuals to effectively buffer against stress. Steptoe and Appels [20] had proposed that in the use of coping techniques such as mindfulness—one's perceived control would enhance the effectiveness of the

technique. The capability of an individual to exercise control of one's thoughts, emotions and reactions empowers the person to deal with the situation more rationally and systematically. In a study it was found that with increase in age, there is increase in work engagement; whereas gender had no role in it [10]. In the case of occupational groups, manual labor workers (blue collars) had less engagement in work compared to managers, educators, and police officers. Work engagement was not seen to be affected by marital status [21].

Majority of studies over the past years have concentrated on the identification and combat of negative aspects of work involvement such as burnout and workaholism. With the progress in positive psychology, interest in the affirmative impact of work involvement has risen [22]. A number of studies have started to consider the links between mindfulness and work engagement [4, 23]. However, there is limited research in the area of study linking work engagement, mindfulness and perceived control. Therefore, this study had been conceptualized to examine whether mindfulness and perceived control of internal states along with major demographic variables—age, gender, marital status, and years of service—act as indicators of employee's work engagement.

The objectives of the present study were framed as: (i) to examine the relationship between psychological constructs of mindfulness, perceived control of internal states, demographic variables and work engagement in front-line employees, and (ii) to examine the major indicators/ role of mindfulness and perceived control of internal states along with demographic variables in work engagement of front-line employees.

Method

The study included 180 employees (51.7% men and 48.3% women) recruited through purposive sampling from five private organizations in two leading cities. The set of employees were popularly called front-liners or pink collar workers, as they represent the employees who are directly involved in production or interaction with the client, therefore vulnerable to the negative effects of high productivity demands from the organization. These employees form the base of every organizational hierarchical structure and are most susceptible to declining work engagement. Any employee above the age of 18, working as a frontline employee with a minimum one year of service was included in the study. Individuals with a history of any psychiatric illness were excluded from the study. The age range of the participants was 21 years to 60 years ($M = 29.9$, $SD = 8.51$). The minimum years of service range from one year to 39 years ($M = 6.40$, $SD = 7.49$). The demographic details of individuals such as age, gender, marital status and years of service were also considered in the analysis. All the participants were full-time salaried personnel. Initially, consent was taken from the respective organizations, a rapport was built and the study objectives were explained to the participants.

The Cognitive and Affective Mindfulness Scale-Revised,

Perceived Control of Internal States Scale (PCOISS) and Utrecht Work Engagement Scale (UWES) were administered in groups and a few times individually. The data gathered from all the participants were analyzed using appropriate statistics.

The tools used in this study were as follows:

The Cognitive and Affective Mindfulness Scale-Revised (CAMS-R): The CAMS-R has 12 items based on a four point rating scale from Not at all (1) to Almost Always (4). It assesses the general daily experience of the capacity and willingness to be mindful. The scale purports to measure attention, present-focus, awareness and acceptance/non-judgment of thoughts and feelings. E.g. "It is easy for me to concentrate on what I am doing." Higher score indicates higher levels of mindfulness. The CAMS-R has exhibited acceptable convergent and discriminant validity with other measures of mindfulness, emotional clarity, avoidance, and over-engagement. For the present sample in this study, the Cronbach's alpha value was 0.37.

Perceived Control of Internal States Scale (PCOISS): The PCOISS is an 18-item scale intended to gauge respondents' self-appraisal of their ability to regulate their internal states and to avert negative events and its effect on emotions, cognition, and wellbeing. The scoring is based on a five point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). E.g. "No matter what happens to me in my life I am confident of my ability to cope emotionally." The scores range from 18 to 90, with high score suggesting high perceived control of internal states. Acceptable construct and incremental validity has been established by this scale. The Cronbach's alpha value was 0.83 for this sample.

Utrecht Work Engagement Scale (UWES): The scoring is done on a seven-point rating scale based on the frequency of occurrence—varying from 0 (Never) to 6 (Always). It includes three subscales—vigor, dedication, and absorption. The definition and examples of each type of subscale are presented below. Vigor refers to enthusiasm, energy and persistence to deal with difficult situations at work. E.g. "When I get up in the morning, I feel like going to work." Dedication refers to the driving force at a job that is derived through a sense of significance from one's work, and challenge, pride, and inspiration related to one's work. E.g. "My job inspires me." Absorption refers to being totally and happily submerged in one's work, often unaware of the surroundings and the flow of time. E.g. "I feel happy when

I am working intensely." High scores on each subscale and high total score are indicative of high levels of engagement in work. Good construct validity has been found with this scale. For the present study, the Cronbach's value for each of the subscales ranged from 0.44 to 0.80.

Results

The obtained quantitative data were analyzed in terms of descriptive statistics, Pearson's product-moment correlation coefficient (Pearson's r), and multiple hierarchical regression analysis using IBM SPSS Statistics 20. In the analysis, the predictors (indicators) were broadly classified into two—psychological constructs (mindfulness, and perceived control of internal states) and demographic variables (age, gender, marital status, and years of service). The criterion was work engagement. In addition to this, each of the dimensions of work engagement was considered as criterions. Hierarchical regression analysis was computed to identify the major indicators. Prior to this, Pearson's r was computed to find a linear relationship between the predictors and criterions, and to identify the suitable predictors to be entered into the model.

The values of Pearson's r along with descriptive statistics (M and SD) are presented in Table 1.

From Table 1, it was found that all predictors except gender had significant positive correlation with total work engagement. The correlation coefficient varied between 0.35 and 0.16. Therefore, mindfulness, perceived control of internal states, age, marital status, and years of service were selected to be entered into the hierarchical model to identify the indicators of work engagement.

In the case of vigor—the first dimension of work engagement—except gender and marital status, all other four predictors showed significant positive correlation. The correlation coefficient varied between 0.35 and 0.16. Hence, mindfulness, perceived control of internal states, age, and years of service were chosen to be entered into the hierarchical model to identify the indicators of vigor.

For dedication—the second dimension of work engagement—it was observed that all predictors except mindfulness and gender had significant positive correlation. The correlation coefficient varied between 0.29 and 0.20. Hence, perceived control of internal states, age, marital status, and years of service were selected to be entered into the hierarchical model to identify the indicators of dedication.

Table 1. Product Moment Correlation Results between Criterions and Predictors (N=180)

Predictors	Criterions					
	M^a	SD^a	Work Engagement	Vigor	Dedication	Absorption
Mindfulness	26.51	3.48	.16*	.25**	.11	.05
PCIS	60.22	8.97	.35**	.35**	.29**	.25*
Age	29.29	8.51	.24**	.20*	.24**	.17**
Gender	-	-	.02	.03	.05	-.03
MS	-	-	.19*	.13	.20**	.13
YS	6.42	7.48	.24**	.16*	.25*	.18*
M^b			39.26	12.76	13.55	12.95
SD^b			9.51	3.64	3.35	4.21

Note. ^aMean and SD of predictors; ^bMean and SD of criterions; ^cMale = '0', Female = '1'; ^dUnmarried = '0' Married = '1'; PCIS = Perceived control of internal state, MS = Marital status, YS = Years of service

* $p < 0.05$, ** $p < 0.01$

Mindfulness, gender, and marital status were not significantly correlated with absorption—the third dimension of work engagement. Among the significantly correlated predictors, the correlation coefficient varied between 0.25 and .17. Thus, perceived control of internal states, age, and years of service were selected to be entered into the hierarchical model to identify the indicators of absorption.

Based on the findings of the above analysis four hierarchical analysis models were developed for work engagement and its three dimensions. As the linearity assumption was tested, other essential assumptions such as normality, homoscedasticity, and absence of multicollinearity were also verified for each model. The results of these four separate models are presented in Table 2 to Table 5.

As seen in Table 2, the significantly correlated predictors were entered hierarchically in three blocks—Block 1 (mindfulness), Block 2 (perceived control of internal states), and Block 3 (age, marital status, and years of service)—in respect of work engagement. Model 1, consisting of mindfulness was found to be significant, $F(1, 178) = 4.50$, $p = .035$, which explained 3% significant proportion of variance ($Adjusted R^2 = .02$) of work engagement. From the analysis, mindfulness was found to be a significant predictor for work engagement ($\beta = .16$, $p = 0.035$) in the model. Model 2, where perceived control of internal states was entered in addition to mindfulness, was found to be significant, $F(2, 177) = 12.75$, $p < 0.001$, and the model explained 10% more significant proportion of variance ($\Delta R^2 = .10$, $p < 0.001$) amounting to total 13% significant proportion of variance of work engagement ($Adjusted R^2 = .12$). The results revealed that in Model 2 only the perceived control of internal states was only found to be a significant predictor ($\beta = .33$, $p < 0.001$) for work engagement. Model 3, demographic variables such as age, marital status, and years of service were entered in addition to mindfulness and perceived control of internal states, was found to be significant, $F(5, 174) = 7.37$, $p < 0.001$. The model accounted for 5% more

significant proportion of variance ($\Delta R^2 = .05$, $p < 0.05$) amounting to a total 18% significant proportion of variance of work engagement ($Adjusted R^2 = .15$). From the analysis it was found that only perceived control of internal states was a significant indicator ($\beta = .31$, $p < 0.001$) for work engagement, in the model.

Likewise, the hierarchical regression analysis models were developed in respect of each of the dimensions of work engagement independently.

As seen in Table 3, the significantly correlated predictors were entered hierarchically in three blocks—Block 1 (mindfulness), Block 2 (perceived control of internal states), and Block 3 (age, and years of service)—in respect of vigor. Model 1, consisting of mindfulness was found to be significant, $F(1, 178) = 11.55$, $p = 0.001$, which explained a 6% significant proportion of variance of vigor. From the analysis, mindfulness was found to be a significant predictor for vigor ($\beta = .25$, $p = 0.001$) in the model. Model 2, where perceived control of internal states was entered in addition to mindfulness, was found to be significant, $F(2, 177) = 15.11$, $p < 0.001$, and the model explained 9% more significant proportion of variance ($\Delta R^2 = .09$, $p < 0.001$) amounting to a total 15% significant proportion of variance of vigor ($Adjusted R^2 = .14$). The results revealed that in Model 2 mindfulness ($\beta = .16$, $p = 0.034$) and perceived control of internal states ($\beta = .31$, $p < 0.001$) were found to be a significant predictors for vigor. In model 3, where demographic variables such as age, and years of service were entered in addition to mindfulness, and perceived control of internal states, was found to be significant, $F(4, 175) = 9.23$, $p < 0.001$. The model accounted for 3% more significant proportion of variance ($\Delta R^2 = .03$, $p = 0.05$) amounting to total 18% significant proportion of variance of vigor ($Adjusted R^2 = .16$). From the analysis it was found that mindfulness ($\beta = .15$, $p = 0.037$) and perceived control of internal states were significant indicators ($\beta = .29$, $p < 0.001$) for vigor, in the model.

Table 2. Hierarchical Regression Analysis for Mindfulness, Perceived Control of Internal States, and Demographic Variables (age, marital status, and years of service) Predicting Work Engagement (N=180)

Model	B	SE	β	Adjusted R^2	R^2	ΔR^2
Model 1 (C=27.87, F=4.50*)				.02	.03	
Mindfulness	.43	.20	.16*			
Model 2 (C=13.79, F=12.75***)				.12	.13	.10***
Mindfulness	.16	.20	.06			
Perceived control of internal states	.35	.08	.33***			
Model 3 (C=10.96, F= 7.37***)				.15	.18	.05*
Mindfulness	.16	.20	.06			
Perceived control of internal states	.33	.08	.31***			
Age	.10	.17	.09			
Marital status	.44	1.72	.02			
Years of service	.16	.18	.13			

Note. C = Constant, B = Unstandardized beta coefficient, SE = Standard error, β = Standardized beta coefficient, $\Delta R^2 = R^2$ change

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4 presents the results when the significantly correlated predictors were entered hierarchically in two blocks—Block 1 (perceived control of internal states) and Block 2 (age, marital status, and years of service)—in respect of dedication. Model 1, consisting of perceived control of internal states was found to be significant, $F(1, 178) = 16.09$, $p < 0.001$, which explained 8% significant proportion of variance of dedication ($Adjusted R^2 = .08$). Model 2, comprising demographic variables—age, marital status, and years of service—in addition to perceived control of internal states, was found to be significant, $F(4, 175) = 7.19$, $p < 0.001$, and it explained 6% additional significant proportion of variance ($\Delta R^2 = .06$, $p = 0.009$) amounting to a total of 14% significant proportion of variance ($Adjusted R^2 = .12$) of dedication. The result highlighted that only perceived control of internal states was a significant indicator ($\beta = .27$, $p < 0.001$) for dedication, in the model.

According to Table 5, the significantly correlated predictors were entered hierarchically in two blocks—Block 1 (perceived control of internal states) and Block 2 (age, and years of service)—in respect of absorption. Model 1, consisting of perceived control of internal states was found to be significant, $F(1, 178) = 11.92$, $p = 0.001$, which explained a 6% significant proportion of the variance ($Adjusted R^2 = .06$) of absorption. The results revealed that perceived control of internal states was a significant predictor ($\beta = .25$, $p = 0.001$). Model 2, comprising demographic variables—age, and years of service—in addition to perceived control of internal states, was found to be significant, $F(3, 176) = 5.76$, $p = 0.001$. However, the model did not show any significant additional proportion of variance of absorption. The result highlighted that only perceived control of internal states was a significant indicator for dedication, in Model 1 ($\beta = .25$, $p = 0.001$) and Model 2 ($\beta = .24$, $p = 0.001$).

Table 3. Hierarchical regression Analysis for Mindfulness, Perceived Control of Internal States, and Demographic Variables (age, and years of service) Predicting Vigor in Work Engagement

Model	B	SE	β	Adjusted R^2	R^2	ΔR^2
Model 1 (C=5.90, F=11.55***)				.06	.06	
Mindfulness	.26	.08	.25***			
Model 2 (C=0.96, F=15.11***)				.14	.15	.09***
Mindfulness	.16	.08	.16*			
Perceived control of internal states	.12	.03	.31***			
Model 3 (C= - 0.95, F= 9.23***)				.16	.17	.03*
Mindfulness	.16	.08	.15*			
Perceived control of internal states	.12	.03	.29***			
Age	.09	.06	.20			
Years of service	-.02	.07	-.04			

Note. C = Constant, B = Unstandardized beta coefficient, SE = Standard error, β = Standardized beta coefficient, $\Delta R^2 = R^2$ change
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4. Hierarchical Regression Analysis for Perceived Control of Internal States, and Demographic Variables (age, marital status, and years of service), Predicting Dedication in Work Engagement

Model	B	SE	β	Adjusted R^2	R^2	ΔR^2
Model 1 (C=5.41, F=16.09***)				.08	.08	
Perceived control of internal states	.14	.03	.29***			
Model 2 (C=4.95; F= 7.19***)				.12	.14	.06**
Perceived control of internal states	.13	.03	.27***			
Age	.01	.08	.01			
Marital status	.50	.77	.06			
Years of service	.11	.08	.20			

Note. C = Constant, B = Unstandardized beta coefficient, SE = Standard error, β = Standardized beta coefficient, $\Delta R^2 = R^2$ change
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5. Hierarchical Regression Analysis for Perceived Control of Internal States and Demographic Variables (age, and years of service) Predicting Absorption in Work Engagement

Model	B	SE	β	Adjusted R^2	R^2	ΔR^2
Model 1 (C = 7.31 ; F=11.92***)				.06	.06	
Perceived control of internal states	.09	.03	.25***			
Model 2 (C=7.04; F= 5.76***)				.07	.09	.03
Perceived control of internal states	.09	.03	.24***			
Age	.002	.06	.01			
Years of service	.07	.07	.16			

Note: C = Constant, B = Unstandardized beta coefficient, SE = Standard error, β = Standardized beta coefficient, $\Delta R^2 = R^2$ change
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Discussion

This study was aimed to investigate whether mindfulness and perceived control of internal states, and other demographic variables are indicators of work engagement or not.

The correlation analysis using Pearson's r confirmed the positive relationship between the criteria and predictors. It shows that with an increase in mindfulness and increase in perceived control of internal states, there is an increase in work engagement. Mindful individuals are 'psychologically present' [24] requiring a high level of perception of control over internal states. On the other hand, mindfulness allows re-perception—affecting an individual's perceived control of internal states [13, 25] or novelty in experiencing events that keep the individual alert, active and immersed in the activity—hinting in an increase in work engagement. Contrarily, mindfulness was not associated with the dimension of absorption. On the other hand, perceived control of internal states showed a positive relationship with the subset of absorption. This is an interesting finding as it helps to understand that mindfulness is a redirection of the orientation of the consciousness to current situations but the quality of absorption would not allow a quick change in the course of action as it requires the individual to be immersed in the activity [26]. More so, such rapid rerouting is possible when one has good control over one's internal states. Similarly, dedication in work engagement is attributed to pride and a sense of accomplishment in the work, but the trait of mindfulness demands detachment and non-superficial awareness of the task.

To address the objective of the study, the major indicators of work engagement were identified. Out of the six predictors under study, five predictors—mindfulness, and perceived control of internal states, along with three demographic variables (age, marital status, and years of service)—were found to be significantly correlated with employee's work engagement. Mindfulness was found to be a significant predictor when it was considered solely as an indicator of work engagement. It is corroborated by Malinowski and Lim's [27] study which found that dispositional mindfulness was linked to work engagement. The quality of mindfulness allows one to focus attention and awareness towards the task at hand, thus enhancing involvement in work. In this study, when other predictors were taken into account, perceived control of internal states was found to be a dominant indicator of work engagement across the models. Therefore, mindfulness and perceived control of internal states are considered as indicators of work engagement, fulfilling the objective of the study.

In case of vigor in work engagement, two—mindfulness, and perceived control of internal states—were found to be significant indicators. However, in case of dedication and absorption, perceived control of internal states was found to be the sole significant indicator. Having a high level of perceived control of internal states, an individual will have a higher level of self-endorsed regulation of perceptual qualities and behavioral modification. It will also facilitate effective coping and manage excessive emotions – such as anger, hostility, fear that clouds clear

thinking and effective problem solving [28], thus providing a pathway in the enhancement of mindfulness practice and naturally increase involvement in work.

Conclusion

The study fulfilled its objective to state that mindfulness was a significant predictor when it was considered solely as an indicator of work engagement. Nevertheless when other predictors were considered, perceived control of internal states was found to be a dominant indicator of work engagement across the models.

Certain limitations of this study must be kept in mind while evaluating the findings. Firstly, this study may not be generalized widely due to its small sample size and purposive sampling technique. Secondly, self-report questionnaires may contribute to inflated responses. Nevertheless, the findings of the study indicate the need for intervention programs that improve perceived control of internal states so that employees' efficiency is reflected on their level of work engagement. While appreciating the effectiveness of practice of mindfulness and strategies to enhance perceived control of internal states, it is encouraged to investigate studies examining the role of various underlying emotional, cognitive and social factors affecting work engagement.

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Coping Competence, Mindfulness, and Well-being of Indian Adolescents

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Abstract Adolescence is a volatile and fragile transitional period of life marked with experiences that threat well-being. The objectives of the study were devised to investigate the relationship between coping competence, mindfulness, and well-being and to examine the role of coping competence and mindfulness on well-being. The study followed a correlational design. A total sample of 221 adolescents (111 boys and 110 girls; age range 14–19 years) were recruited from schools and colleges through purposive sampling and were administered the following scales: cognitive and affective mindfulness scale-revised, the coping competence questionnaire, and WHO Well-Being Index 5. The obtained quantitative data were analyzed using descriptive statistics, independent samples *t* test, Pearson's correlation and standard multiple regression. A significant positive relationship between all the three variables, viz. coping competence, mindfulness and well-being was found. Multiple regression analyses indicated that both the variables-coping competence and mindfulness (together as a model) predicted well-being but did not make significant individual contributions in

predicting well-being. The implications and limitations of the study are discussed.

Keywords Adolescents · Coping competence · Correlational design · Mindfulness · Well-being

Introduction

One-fourth of India's population comprises adolescents (Kalyanwala et al., 2013). Adolescence is a fragile transitional period of life ranging between the onset of puberty till attainment of legal and developmental maturity (roughly 11–19 years). Volatile nature and rapid mood shifts during this phase often result in experiences of negative emotions, threatening their psychological well-being in the current state and in later part of life. Failure to sail through the predicaments can hinder several by-products of well-being such as happy interpersonal relationships, academic success, and the ability to become competent and rational adults (Seligman, 2002; Keyes, Shmotkin, & Ryff, 2002).

Previous research studies have found that mindfulness exercise plays a mediating role in enhancing well-being (Kong, Wang, & Zhao, 2014; Wenzel, von Versen, Hirschmüller, & Kubiak, 2015) also documented in various studies involving college students (Bajaj & Pande, 2016; Mandal, Arya, & Pandey, 2011). It is speculated that among these mediators, coping competence of the individual will have an impact on well-being, founding the curiosity behind this study's investigation.

Adolescents face more perceived uncontrollability of affective and achievement-related situations (Moreland & Dumas, 2008) and is indicative of resilience stability, which increases with age (Compas, Connor-Smith,

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Saltzman, Thomsen, & Wadsworth, 2001). Schroder and Ollis (2013) have defined *coping competence* as “the capacity to effectively cope with failure and negative life events as indicated by a reduced likelihood of helplessness reactions and fast recovery from any occurring helplessness symptoms.” It is also obligatory to distinguish the concept of coping competence often confused with similar overlapping constructs. Coping skill is the psychological mechanism of adapting when faced with a stressful event (Frydenberg & Lewis, 2009). Coping strategies are the specific methods used in coping (Lazarus & Folkman, 1984). Coping style is the type of repertoire and number of strategies one accesses to cope with a crisis (Hariharan & Rath, 2008). An adolescent with high resilience will cope better in the face of adversities and look for ways to reduce the negative effects of stress (Murphey, Barry, & Vaughn, 2013), whereas low coping competence engages in habitual emotional reactivity of negative coping strategies to cues or experiences making them prone to depression in the face of stress (Schroder, 2012).

Mindfulness, as connoted in the study, borrows its description given by Kabat-Zinn (2005) as a non-judgmental awareness that emerges through paying attention to the present moment, on purpose, guided toward the unfolding of experiences, emotions, cognitions, and bodily sensations, as well as external stimuli such as sights, sounds, and smells which vary moment to moment.

Well-being is defined as a state in which the individual realizes his or her own abilities, can cope with the normal stresses of life, work productively and fruitfully, and is able to make a contribution to the community (Bodeker & Ong, 2005). It may also be understood as an ability to cope with adversities and negative experiences (Ryan & Deci, 2001). Well-being in adolescents as theorized by Hooper, Thompson, Laver-Bradbury, and Gale (2012) is described through five factors: “personal strengths, emotional well-being, positive communication, learning strengths, and resilience.” One of the important highlights here is the meaningful and progressive coping in the face of adversities. This kind of resilience is intertwined with low negative emotionality and rumination, along with the competence to foster strong self-belief and personal security against challenges.

Relationship Between Coping Competence, Mindfulness, and Well-Being

Coping competence has been found to have positive correlation with essential functional coping strategies (Schroder & Ollis, 2013). The functionality of mindfulness enhances well-being and regulates the affective state by allowing complete processing of the experience, thereby providing adequate time and emotional balance to evoke

the effective strategies to cope with the situation (Akin & Akin, 2015). Benefits of mindfulness have shown its association with behavioral and affective regulation, cognitive flexibility and subjective well-being (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007). Coping competence may be imbibed into the cognitive behavioral patterns of behavior and be easily modified as required in the face of crises. Coping competence may have a bi-directional role in enhancing the mindfulness state (Schroder, 2012). Firstly, a mindful approach requires the affective and cognitive flexibility of an individual to deal with an adversity; secondly, high coping competency allows adaptive response time for emotionally stabilizing coping strategies. Mindfulness provides adequate time for the re-perception of the event (Shapiro, Carlson, Astin & Freedman, 2006) avoiding habitual reactivity and immediate activation of negative affect state associated with the event, circumventing undue situational distress. People with low level of mindfulness possess a depressogenic style and act impulsively on autopilot behavior eliciting reactions like anger and anxiety (Thomas, 2011).

Western studies have provided contextual evidence—such as the multi-method study by Weinstein, Brown, and Ryan (2009) and another by Carmody and Baer (2008) which found that mindful individuals are suggestive of positive well-being indicated by symptom reduction, and use of adaptive coping mechanisms generating better well-being. Studies specifically in the adolescence population of other countries have also confirmed the mediatory role of coping competency between mindfulness and well-being (Schonert-Reichl & Lawlor, 2010; Akin & Akin, 2015). The findings of these studies hold important reflections in the formulation of the objectives of the study, which attempts to extend research available on well-being of Indian adolescents (Chhabra and Kaur, 2013; Agarwal & Dixit, 2017; Talathi & Mhaske, 2017). The objectives of the study were devised to investigate the relationship between coping competence, mindfulness, and well-being and to examine the impact of coping competence and mindfulness on well-being.

Method

Participants and Procedure

The study used a correlational design and sample was sought using purposive sampling method. A total sample of 221 adolescents (111 boys and 110 girls) with age ranging between 14 and 19 years ($M = 18.30$, $SD = 0.83$) from different socio-economic backgrounds was recruited from schools (47.08%) and colleges (52.91%) in Hyderabad, India. After permission requisitions from institutions, the

objectives of the study were explained following which consent and assent were obtained from the participants following scale administration.

Research Tools

Coping Competence Questionnaire developed by Schroder and Ollis (2013) consists of 12 items with a six-point Likert response scale ranging from *very uncharacteristic of me* (1) to *very characteristic of me* (6). Items are reverse scored and summed, total ranging between 12 and 72. High scores indicate resilience (coping competence) and vice versa. Internal consistency of the English CCQ was found to reach or exceed 0.90 (Schroder 2004). The Cronbach's alpha value of the questionnaire for this study sample was found to be 0.82.

Cognitive and Affective Mindfulness Scale-Revised (CAMS-R) developed by Feldman et al. (2007) is a 10-item scale with a four-point rating scale ranging from *rarely/not at all* (1) to *almost always* (4). Item 6 is reverse scored. The total score is obtained by calculating the sum of all items. Higher scores on the scale suggest higher levels of mindfulness. The level of internal consistency in two student samples was found to be 0.74 and 0.77 (Feldman et al., 2007). The Cronbach's alpha value for this study sample was found to be 0.63.

WHO (Five) Well-Being Index (1998). It is a five-item scale with a six-point Likert scale ranging from *all of the time* (5) to *at no the time* (0). The total score is the sum of each item score—ranging from 0 (worst possible quality of life) to 25 (best possible quality of life). The Cronbach's alpha for this study was found to be 0.71.

Results

The quantitative data were analyzed using descriptive statistics, independent samples *t* test, Pearson product-moment correlation, and standard multiple regression using SPSS 20.

Gender Differences in Variables

An independent samples *t* test was done to assess gender differences in coping competence, mindfulness and well-being. It was observed that girls and boys did not differ on any of the variables—coping competence $t(219) = -.01, p = 0.99$, (girls— $M = 48.00$, $SD = 11.61$; boys— $M = 48.01$, $SD = 8.77$), mindfulness $t(219) = 1.68, p = 0.09$, (girls— $M = 27.18$, $SD = 4.85$; boys— $M = 26.17$, $SD = 4.03$), and well-being $t(219) = -1.44, p = 0.15$, (girls— $M = 14.67$, $SD = 4.84$; boys— $M = 15.55$, $SD = 4.17$).

Relationship Between the Variables

The summary of means, standard deviations, and inter-correlations are presented in Table 1. Coping competence was significantly positively related to mindfulness ($r = .29$), $p < .01$, and well-being ($r = .15$), $p < .05$). Mindfulness was found to be significantly positively related to well-being ($r = .16$), $p < .05$. This suggests that increase in coping competence and mindfulness is associated with increase in well-being among adolescents although the magnitude of the correlation coefficients suggests a weak relationship.

Main Effects

Through multiple regression analysis (enter method), it was observed that both the variables—coping competence and mindfulness (together as a model), explained significant (4%) proportion of variance in well-being among adolescents ($R^2 = 0.04$, adjusted $R^2 = 0.03$, $F(2, 218) = 4.51$, $p < 0.05$). However, both the variables did not make significant individual contributions in predicting well-being (Table 2).

Discussion

The results showed significant positive correlations between the variables, indicating that as coping competence (resilience to helplessness in stressful situations) and mindfulness increased, well-being among adolescents also increased, justifying the first objective of the study. Findings of the regression model demonstrated that both coping competence and mindfulness combined predicted well-being corroborated by a study of 98 undergraduate students which established that use of appropriate coping strategies affect the psychological state (Gustems-Carnicer & Calderón, 2013). The implied inference here is the ability to use the suitable resources in an adverse context vis-à-vis coping competence was found to be beneficial in terms of better psychological well-being. Keng, Smoski, and Robins (2011) in their study concluded that mindfulness brings about several positive psychological effects like increased subjective well-being, reduced psychological symptoms, reduced emotional reactivity, and improved behavioral regulation.

The interesting highlight of the study is that mindfulness and coping competence individually did not enhance well-being. As Schroder (2012) has explained, mindfulness and coping competence are complementary processes that work harmoniously in the face of a crisis. Mindfulness increases adaptability to stress, whereas coping competence entails an adaptive strategy similar to mindfulness when needed to

Table 1 Means, standard deviations, and inter-correlations between age, gender, coping competence, mindfulness, and well-being ($N = 221$)

Variables	1	2	3	4	5
1. Age	1.00	-.03	-.08	-.03	.00
2. Gender		1.00	.00	-.11	.10
3. Coping competence			1.00	0.29**	0.15*
4. Mindfulness				1.00	0.16*
5. Well-being					1.00
Mean			48.00	26.67	15.11
Standard deviation			10.25	4.47	4.53

* $p < .05$, ** $p < .01$

Table 2 The standard multiple regression analyses ($N = 221$)

Predictors	B	SEB	β	t	p
Coping competence	0.04	0.03	0.11	1.60	0.11
Mindfulness	0.13	0.07	0.13	1.95	0.05
R^2	0.04				
C	9.08				
F	4.51	$p < .05$			

Dependent variable: well-being; B = unstandardized beta coefficient, SEB = standardized error of beta, β = standardized beta coefficient, t = t values of beta, p = significance level, * $p < .05$

deal with an adversity. Akin and Akin (2015) slightly digress from the findings of this study as they established coping competence as a mediating variable between mindfulness and flourishing. This study did not find such predictability between mindfulness and coping competence, rather it establishes the two variables together to predict well-being.

The study adds notable extension to the existing literature on Indian adolescents, helpful in designing coping competence and mindfulness-based psychosocial interventions for adolescents to cultivate these natural cognitive skills (Brown & Ryan, 2003; Miners 2007). Fostering of mindfulness qualities and coping competence would facilitate the adolescent's resilience, which in turn would influence their well-being. These programs would assist adolescents in coping with feelings of discouragement, depression, loss of self-confidence and hope, and stunted belief in one's psychological capital.

It is encouraged that empirical studies should implement rigorous experimental designs to examine the impact of mindfulness, coping competence, and other potentially protective indices of well-being among Indian adolescents, particularly developing tailor-made approaches that can be integrated into ongoing school and college curricula, and compatible with the student's developmental level (Noam & Hermann, 2002). This study falls short in terms of

inclusion of socially desirable responses, a developmental phase-specific study, and a composite design, to holistically investigate other factors contributing to adolescents' well-being.

Funding There was no funding associated with this research.

Compliance with Ethical Standards

Conflict of interest The authors declare no conflict of interest.

Ethics Approval This study drew sample from general population and included only those who were willing to participate by signing the informed consent form. The tools used are simple self report scales and the participation in the study has zero risk involvement. Hence it was not mandatory in our institution to obtain the clearance from Institute Ethics Committee.

Consent to Participate Consent form used.

Consent for Publication The authors jointly consent for the manuscript to be published by the journal.

Availability of Data and Material Data available on request from the authors

Code Availability SPSS statistical software (IBM SPSS Statistics).

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Well-being indices: A role of mindfulness and social support

Meera Padhy, Prabhati Pati¹, Sandra Roshni Monteiro

Abstract:

BACKGROUND: Well-being is a desired and optimal state of functioning of individuals, which may be modified through various psychological factors. Mindfulness is a cultivable state of mind, which enhances experiential processing of stimuli. It is hypothesized that apart from mindfulness, the social environment of the individual vis-à-vis social support may help predict well-being. This study was done to examine mindfulness, social support, and well-being, their relationship and role in the Indian population.

METHODS: Through purposive sampling, 375 men and women (mean age = 35.05 years; standard deviation = 12.82) were recruited into the study and were administered the cognitive and affective mindfulness scale-revised, interpersonal support evaluation list, and the brief inventory of thriving. The obtained quantitative data were analyzed using descriptive statistics, Pearson's product-moment correlation coefficient (Pearson's *r*), and multiple hierarchical regression analysis.

RESULTS: The results showed a positive correlation among mindfulness, social support and its dimensions (tangible, appraisal, and belonging), and well-being. Regression analyses revealed that mindfulness and social support in combination contributed to well-being, where belonging support was seen to be a unique significant predictor.

CONCLUSION: It can be concluded that both mindfulness and social support are significant indices of well-being, and this is especially useful in developing psychosocial interventions that would enhance well-being. Implications and limitations of the study have also been discussed.

Keywords:

Indian population, mindfulness, social support, well-being

Introduction

In the last decade, the construct of mindfulness has been gaining popular acceptance among health-care stakeholders, researchers, and clinicians, while being seamed into wellness and stress reduction interventions because of its practical and instant benefits.^[1,2] Kabat-Zinn^[3] has comprehensively described mindfulness as "the awareness that arises through paying attention in a particular way: On purpose, in the present moment, and nonjudgmentally." Concisely, it suggests wakeful consciousness toward the moment and acknowledgment of the experience.^[4] On the one hand, while

well-being may be anticipated along with high mindfulness,^[5] it is also imperative to analyze the role of the social environment that may protect or impede the optimal functioning of the individual and also known to predict well-being.^[6,7] Basing ground for cumulatively analyzing the variables, this study proposes to investigate the relationship between mindfulness, social support, and well-being, as well as understand the role of the former variables on well-being of Indian individuals. This study gains particular cultural relevance as social support is perceived differently in different cultures.^[8]

Mindfulness has its obvious positive effects, with evidence stemming from a study by Lykins and Baer,^[9] which compared

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meditators and nonmeditators on several aspects of psychological well-being. The results showed that meditators reported significantly higher levels of mindfulness, self-compassion, and overall better sense of well-being vis-a-vis nonmeditators. Typically, mindfulness can be cultivated by deliberately tuning focus to experiences that are occurring in the current moment. The process can be comprehended as a temporary experience (state) or dispositional (trait) in nature which is subject to increase with long-term practice.^[10] The meditational process allows self-observation and deactivation of automatic pilot reactions such as panic, anger, and stress reactivity and activates several strategies that required to fulfill basic psychological needs.^[4,11,12]

To substantiate further, various studies have demonstrated that mindfulness is linked to promoting positive relationships, regulating emotions, and boosting satisfaction and well-being.^[13,14] Mindfulness may facilitate interpersonal relationships through emotional clarity, unbiased outlook, and better observations of others' behavior.^[15] Having quality relationships will strengthen the social network of the individual and simply recognizing this support, received or perceived, may affect well-being.^[16,17] Social support plays a major role for healthy life. It makes people feel like they belong to a community of people who care for them, love them, and support them, while also conferring resilience to stress.^[18] The importance of social support may be emphasized by evidence that adolescents with highly supportive parents reported to have better well-being in terms of lower negative emotions, higher positive emotions, and higher self-esteem.^[19] Further evidence found in study by Malkoc and Yalcin,^[20] showed that perceived social support from family, friends, and significant others contributed to psychological wellbeing. Conversely, it of essence to note that mindfulness practice steps in to shield the well-being status in individuals who report low social support.^[21]

People high in dispositional mindfulness traits and experienced mindfulness meditators are often described as "warm" and are intimately in touch with the joys and sufferings of their fellow humans.^[22] The connection between mindfulness traits and relationship satisfaction was also examined where it was found that higher levels of trait mindfulness predicted higher relationship satisfaction, along with an increased ability to respond constructively and flexibly to friction in relationships.^[13] They proposed that the practice of mindfulness might improve interpersonal attunement, which might increase satisfaction with one's relationships.^[14]

Rationale of study

Each person is subjected to life stresses that affect their health and overall well-being in today's date.

Remarkable research work has been done in the field of well-being in the recent years and several factors have been found to be correlated with well-being. A number of studies have been conducted on relationship between mindfulness and well-being as well as social support and well-being. However, taking all the three variables into consideration, studies conducted on the Indian population are scarce. This study was done to examine mindfulness, social support, and well-being, their relationship and role in the Indian population. Any insight on these dimensions can be used to get a better understanding of the processes and help in planning of effective interventions that enhance well-being.

Methods

Study sample and procedure

A total of 375 participants participated in the study. Of them, 46% ($n_1 = 174$) were male and 54% ($n_2 = 201$) were female. The mean age of the samples was 35.05 years (standard deviation [SD] =12.82), with sample's age ranging between 18 and 60 years. In relation to occupation, 53% were employed and 47% were students.

Cognitive and Affective Mindfulness Scale - Revised (CAMS-R).^[23,24] CAMS-R has 12 items based on a 4-point rating scale from not at all^[1] to almost always.^[4] It assesses the general daily experience of the capacity and willingness to be mindful. The scale purports to measure attention, present-focus, awareness, and acceptance/nonjudgment of thoughts and feelings. For example, "It is easy for me to concentrate on what I am doing." Higher score indicates higher level of mindfulness. The internal consistency score is 0.76 (Feldman *et al.*, 2007). For the present sample in this study, Cronbach's alpha value was 0.50.

Interpersonal Support Evaluation List (ISEL).^[25] ISEL-15 is derived from the long form of the ISEL and contains 15 items which assess the perceived availability of tangible, appraisal, and belonging social support on a two-point scale of "True" and "False." Some of the items measuring each dimension of social support are "if I need help moving, I would be able to find someone to help me" (tangible support); "there is at least one person I know whose advice I really trust" (appraisal support); and "when I feel lonely, there are several people I could talk to" (belonging). The internal reliability of the total scale of ISEL, as given by the developers, ranges from 0.88 to 0.90. Similarly, for subscales it ranges from 0.70 to 0.82. For the present sample in this study, Cronbach's alpha value was 0.72, and for the dimensions of tangible support, appraisal support, and belonging support, it was found to be 0.45, 0.60, and 0.59, respectively.

Brief Inventory of Thinking (BIT).^[26] BIT was used to measure psychological well-being of the participants. The BIT has 10 items, measuring 6 of the 7 core psychological well-being dimensions (positive relationships, engagement, mastery, meaning, optimism, and subjective well-being). An example of the items in the scale, "I feel good most of the time." The responses for each item were in the form of a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly agree). The tool has high internal consistency with reliability coefficients above 0.90, and test-retest reliability of 0.83. The Cronbach's alpha for this subscale was 0.85 in the current study.

Procedure

The purpose, methods, risks, and benefits of the study were explained to the participants before they decided to participate. The participants were assured that their participation would be completely voluntary and that they would have the right to quit their participations at any stage if they did not feel comfortable in continuing the process. The participants were initially given a statement of informed consent, followed by a demographic questionnaire. After being presented with the statement of informed consent and the demographic questionnaire, the participants completed a battery of measures comprised of the previously mentioned scales. Upon completing the battery of measures, the participants were debriefed and thanked for their participation in the study.

Results

The obtained quantitative data were analyzed using descriptive statistics, Pearson's product-moment correlation coefficient (Pearson's r), and multiple hierarchical regression analysis using IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp. In the analysis, the predictors were mindfulness and dimensions of social support (tangible, appraisal, and belonging). The criterion was well-being. Prior to the hierarchical regression, Pearson's r was computed to find a linear relationship between the predictors and criterion, and to identify the suitable predictors to be entered into the model.

Relationship among the measures

The values of Pearson's " r " along with descriptive statistics (M and SD) are presented in Table 1. From Table 1, it was found that all predictors had significant positive correlations with well-being. Mindfulness was positively related to all the dimensions of social support except appraisal support. The significant correlation coefficient between predictors and criterion varied between 0.23 and 0.48. Therefore, mindfulness

Table 1: Correlation between mindfulness, dimensions of social support and well-being

	1	2	3	4	5	6	M	SD
1. Mindfulness	1	0.15**	0.06	0.17**	0.16**	0.40**	41.70	2.95
2. Tangible		1	0.40**	0.38**	0.76**	0.25**	3.51	1.26
3. Appraisal			1	0.36**	0.78**	0.23**	3.51	1.39
4. Belonging				1	0.78**	0.48**	3.63	1.33
5. SS total					1	0.41**	10.65	3.05
6. Well-being						1	37.04	7.08

* $P < 0.05$, ** $P < 0.01$. Men=1, Women=2, SS=Social support, SD=Standard deviation

and dimensions of social support were included in the hierarchical regression model as predictors.

Predictors of well-being

Basing on the findings of the above analysis, hierarchical regression analysis was performed. As the linearity assumption was tested, other essential assumptions such as normality, homoscedasticity, and absence of multicollinearity were also verified. The results of the model are presented in Table 2.

As seen in Table 2, the significantly correlated predictors were entered hierarchically in two blocks: Block 1 (mindfulness), Block 2 (dimensions of social support)-in respect of well-being. In Model 1, mindfulness was found to be significant, $F(1, 373) = 69.26$, $P < 0.001$, which explained 16% significant proportion of variance (Adjusted $R^2 = 0.16$) of well-being. From the analysis, it was found to be significant predictor for well-being ($\beta = 0.40$, $P < 0.001$) in the model. In addition to mindfulness, when dimensions of social support were entered, Model 2 was found to be significant, $F(4, 370) = 46.17$, $P < 0.001$, and the model explained 17% more significant proportion of variance ($\Delta R^2 = 0.17$, $P < 0.001$) amounting to total 33% significant proportion of variance of well-being (Adjusted $R^2 = 0.33$). The results revealed that in Model 2, belonging support was found to be a significant predictor ($\beta = 0.39$, $P < 0.001$) for well-being in addition to mindfulness.

Discussion

The first objective of this study was to examine the relationship between mindfulness, social support, and well-being. The second objective of the study was to assess the role of mindfulness and social support on well-being.

The first objective was confirmed. The findings of this study strongly resonate with research evidence that have established that mindfulness is positively associated with different positive constructs like emotion regulation, compassion and empathy which play a significant role in good and intimate relationships.^[13,14] Further, social support and its positive association as found in

Table 2: Summary table of hierarchical regression analysis for mindfulness and dimensions of social support predicting well-being (n=375)

Model	B	SE	β	t	Adjusted R^2	R^2	ΔR^2
Model 1 (C=2.63, F=69.62***)					0.15	0.16	
Mindfulness	0.95	0.11	0.40	8.32***			
Model 2 (C=-4.43, F=46.17***)					0.33	0.33	0.17***
Mindfulness	0.78	0.10	0.32	7.45***			
Tangible	0.16	0.27	0.03	0.58			
Appraisal	0.29	0.24	0.06	1.18			
Belonging	2.09	0.25	0.39	8.21***			

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$. C=Constant, B=Unstandardized beta coefficient, SE=Standard error, β =Standardized beta coefficient, t=t values of beta, $\Delta R^2 = R^2$ change

this study have been demonstrated by Gallagher and Vella-Brodrick,^[17] which showed significant contribution of social support in well-being. The significant relationship between social support and well-being is well rooted in basic motivational theories which illustrate the need for affiliation and belongingness in human beings. Such strong derivations of well-being from positive relationships might be based on the value human beings put in relationships.^[27] As social beings, individuals derive pleasure and satisfaction from closeness and inclusivity with other people and groups.^[28] Our relationships with people give meaning to life and more the healthy relationships one has, happier one feels, which is also corroborated in the study by Siedlecki *et al.*,^[6] in which components of social support and components of subjective well-being were found to be related with each other. This study also propounds a relationship between mindfulness and well-being. The quality of mindfulness helps to provide clarity and vividness to any situation, and moreover disengages a person from unhealthy behavior patterns.^[29] Detailed processing of experiences will naturally lower discontent in experiences and boost emotional regulation which would subsequently improve relationship quality and well-being.^[30] Keng *et al.*,^[2] too, have concluded that mindfulness brings about several positive psychological effects, including increased subjective well-being, reduced psychological symptoms, reduced emotional reactivity, and improved behavioral regulation. Imminent evidence from Creswell *et al.*,^[31] Highlighted that mindfulness practice helped reduce loneliness and concomitant health risks which consolidates the finding of the positive relationship between mindfulness and social support.

Second, the regression analyses clearly states the role of mindfulness and social support. This is reinforced by the study by Wilson *et al.*,^[32] study of 1024 adults showed that higher perceived social support was indirectly related to poor psychological well-being indices such as depression, anxiety, dysfunctional attitudes, and it was routed through mindfulness. An extension of the same study again accounted that perceived social support was related to mindfulness and psychological well-being outcomes.

This result illustrates that mindfulness and social support are interlinked in terms that characteristics of mindfulness allow non judgment and acceptance, while social support signals self-kindness, acceptance, and being accepted, jointly affecting well-being. Belongingness in the form of social support has special relevance in the social support structure as it may elucidates a basic motivational need of individuals to integrate their self into an interpersonal system. A study by Hagerty and Williams^[33] highlighted that compared to social support in general had an indirect effect on depression; whereas sense of belonging directly affected depression state. In fact, Hagerty *et al.*,^[34] had stressed upon the sense of belonging to be related to both psychological and social functioning, with a higher sense of belonging promoting better functioning.

Conclusion

The results are consistent with the proposed hypothesis that mindfulness and social support play a role in well-being, with belongingness form of social support having significance variance among other predictors of social support.

Implications

The findings of this study provide strong evidence relevant for the Indian context, as mindfulness and social support are expected to be highly prevalent in a country affiliation orientation in families is high. This study also encourages the implementation of group-based mindfulness activities that would naturally nurture belongingness along with the practice effectively improving well-being. Cues may also be taken to enhance further research that would understand the different pathways and processes contributing to well-being.

Limitations

As an exploratory study, this study utilized only self-report measures. These limitations may be overcome by integrating objective measures, such as interview, with subjective measures in future experimental studies. Cross-sectional studies would definitely build better

understanding of social support needs which may be age-specific.

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Conflicts of interest

There are no conflicts of interest.

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Children as adherence enhancing agents in management of primary hypertension of adult family members

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Abstract:

BACKGROUND: Self-management of hypertension requires timely medication, prescribed diet, consistent exercise, and daily monitoring of health parameters to avoid its fatal consequences. Compliance is often difficult without family support, and this study aims to explore the agency of children in the mitigation of the disease.

OBJECTIVES: To examine the effectiveness of children in their family member's hypertension management, an antihypertensive educational module was provided to them.

METHODS: A sample of 43 children between 11 and 14 years of age, who had each identified a hypertensive family member, was provided with holistic information about hypertension through a video, information booklet, and interactive discussions reinforced at three intermissions over a span of 6 weeks. Children and adults were assessed for hypertension knowledge before and following intervention. Change in hypertension compliance and blood pressure (BP) was observed for the adults.

RESULTS: The results showed that children had a significant improvement in overall hypertension knowledge test including its domains. The monitoring records reported to highlight the efforts put by the children during the course of the study. Assuming its intended effects, a significant reduction in the systolic and diastolic BP reading was observed with an overall improvement in compliance. Interestingly, the knowledge status in adult participants had not increased.

CONCLUSION: The results have been discussed which highlight the role of children in influencing "their patients." It unlocks a gateway of research involving children, especially in primary and tertiary approaches to secure chronic disease prevention and management.

Keywords:

Children's agency, hypertension management, primary prevention, tertiary management

Introduction

Late childhood normally facilitates an intellectual boom and sophisticated cognitive comprehension of health concepts.^[1-3] Extending the functionality of children in monitoring adult health is a relatively unexplored area owing to associated popular negative stereotypes.^[4] Contrarily, studies^[5] have put forth a scientific proposition which propounds reliability of children who when equipped with an accurate knowledge base are stimulated to

employ their creative wisdom to achieve goals. It is to emphasize that, in actuality, children tend to be less prejudiced, especially by fatalistic beliefs.^[6] Furthermore, evidence suggests that children when equipped with optimal knowledge can have considerable impact on their peers,^[7] their parents, and others adults.^[8] Intergenerational transfers of knowledge in cases of overall health and hygiene have been reported to improve knowledge and health protective activity in their home environment^[9-12] such as increased physical activity,^[13] reduced salt intake, compliance to dietary patterns, and other daily healthy habits.^[14] Interventions

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related to cardiovascular prevention and antihypertensive lifestyle modification have advocated that children not only helped to improve the cardiovascular status of their parents but also avoided their own vulnerabilities of health.^[15-17] These studies provide valuable insight to the proposal that, if children possess the right information, they can be the much-needed warriors to fight the consequence of several chronic illnesses which require consistent and indulgent self-care.

This study centers on the case of hypertension or high blood pressure (BP) described as a persistent elevated force of the blood against the walls of the blood vessels in a body. It is recorded as systolic BP – which measures the pressure when the heart is in action, and diastolic pressure – when the heart rests.^[18] Broadly, it is categorized as primary hypertension (or essential hypertension) and secondary hypertension.^[19] Despite hypertension being the leading cause of death in India,^[20] its poor management is highly prevalent even if the patient is aware of his/her diagnosis.^[21] This information is important because hypertension is a manageable disease and a 2 mmHg population-wide decrease in hypertensive status can prevent up to 151,000 stroke and 153,000 coronary heart disease deaths in India.^[22,23]

The fact of the matter encourages the use of a sustainable and cost-effective novel to counter the treatable epidemic. A pressure for adherence behavior and an effective management of any chronic illness has been known to ideally involve the participation of the patient and the family.^[24] Adjunct within this concept, children constitute a very important segment of the family and their alacrity, alertness, and their perseverance in achieving their goals cannot be underestimated. It is understandable that any voluntary change in health behavior or lifestyle requires strong conviction and a strong cognitive base^[25] and utilizing their unique tenacity^[26] in influencing family members and ensuring compliance for better management of hypertension.^[27,28] Previous studies have also emphasized the integral role of “perceived ability of supportive functions” and its relationship to lower probability of health risk behavior.^[29-32] The innovative idea originating from this evolved into verifiable research intent to assess if this can be used tactfully yielding important health outcomes.

Research questions

This study attempted to find the agency of children in hypertension management of their adult family member through three implicated research questions:

- i. Will a knowledge intervention increase the hypertension knowledge among children?
- ii. Will the knowledge intervention provided to children reflect in enhancement of hypertension knowledge in the hypertensive adult family members?
- iii. Will knowledge intervention and entrusting of caregiver responsibility to children result in improvement in clinical adherence and BP (in terms of lowered BP readings) among the hypertensive adult family members?

Objectives

In pursue of the research questions, the following objectives of the study were formulated:

- i. To examine if knowledge intervention creates a cognitive base with respect to hypertension knowledge among children and hypertensive adult family members
- ii. To assess the agency of children in lifestyle monitoring of hypertensive adult family members to gauge change in hypertension management and prognosis, if any.

Methods

Study design

A quasi-experimental interrupted time series design as advocated by Biglan, Ary, and Wagenaar (2000) has been adopted as a framework for this study.

Sample

Four schools were selected to be included in the sample. The study was conducted with 43 pairs of students and their adult hypertensive family members. They were recruited using purposive sampling. The children (13 boys and 30 girls) were from Classes 6, 7, and 8 with their age ranging between 11 years and 14 years. Their adult hypertensive counterparts comprised fathers, mothers, grandfathers, grandmothers, and aunts. Their age range was between 28 years and 75 years (mean = 48.02; standard deviation [SD] = 5.91). Among adult participants, 12 of them were literate, whereas 31 of them were illiterate. The mean duration of their diagnosed hypertension condition was 6.67 years (SD = 5.91).

Tools

Hypertension knowledge test (HKT)^[33] is a 22-item knowledge test with five multiple choice options with only one correct answer. The items cover four dimensions – general awareness of hypertension, lifestyle factors, causes care and casualty of hypertension, and medical management. The total score is calculated as a sum of the scores of each of the subscales. Higher scores indicate higher levels of hypertension knowledge. Cronbach’s α for the test was found to be 0.79.

Hypertension compliance scale (HyComps).^[34] HyComps is a 15-item scale provided with five alternatives depending on frequency of behavior and is used for assessing compliance to diet, exercise, lifestyle, and

self-monitoring aspects of clinical adherence – four dimensions of hypertension management. Higher the score indicates better the adherence. For this test, Cronbach's α found was 0.73.

A digital sphygmomanometer was used to measure the BP of the hypertensive unit of the sample. The recorded BP was calculated as an average of three readings taken over a brief duration of time (about 30 min). Preintervention recording was done in the recruitment session, and a second set of data was recorded in the postintervention testing session.

Procedure

Ethical clearance

The study was approved by the Institutional Ethics Committee. Administrative permission was obtained from schools for conducting the study. The school assigned one teacher to help the investigator with the students. A letter was sent to the parents of all the children along with patient pro forma which noted details of the family members with hypertension, its duration, and their relationship with the child. Informed consent forms were sent to the parents of those children from Classes 6 to 8 where an adult member was diagnosed with primary hypertension. The children whose parents signed the informed consent were given the assent form to confirm their willingness to participate in the study. Children for whom we had both informed consent and assent were included in the study. The baseline data were collected from the children and adult participants having hypertension.

Parameters recorded for patients with hypertension

The adult participants had their BP recorded, and they were administered the HKT and HyComps to measure their knowledge about hypertension and their level of adherence to its treatment.

Intervention for the children

The children were given knowledge intervention in the form of a 30 min video show which consisted of a physician explaining all the aspects of hypertension, prevalence of the disease; detailed explanation of the disease mechanism affecting the human anatomy – causes and casualty; the recommended medical management; common myths and mistakes associated with the treatment process; diet and exercise requirements; and consequences of nonadherence. The informational video was exposed to the children on day 1, day 7, and day 21 from the onset of the study. The reason for repeated exposure followed by discussions was to create a strong cognitive base in children about "primary hypertension." After every exposure, a discussion was held about the significance of managing hypertension, the importance of following the prescribed diet and exercise regimen as a part of the treatment process, the possible adversities

of nonadherence, and the benefits of adherence. The sessions were managed by a trained health psychologist specializing in the area of behavioral cardiology who was also able to placate any health anxiety stemming from the exposure to the video and also positively invoke the children of their rights and responsibilities to good health and positive lifestyle modification.

Orientation on the role of children to monitor the adult hypertensive in the family

Children were trained to partake in an activity to monitor their adult hypertensive family member to responsibly take care of them as "their patient." Taking care meant ensuring that the patient took the medication in time, did not deviate from the low fat low salt diet, and did carry out the physical exercise as advised by the doctor. Their "patient care" was documented on a daily basis on a booklet they were provided with which had demarcations of date, medicine, diet, and exercise. The provision on each page was for a period of 1 week. Under each of the labels, children were instructed to check upon "their patient" daily to make sure if they had taken their medicine on time, complied with the prescribed diet, and exercised as prescribed. They were instructed to record the daily observations as "Yes," "No," or "Don't Know." In case they forgot to monitor them for the day, they were instructed to write "Forgot or forgot to Record" under the date. At the end of each week, the week's recording was collected from them. Children were asked to maintain this record for a period of 6 weeks.

Statistical methods

The relevant statistics applied to the data were descriptive statistics such as mean, SD, and percentage and inferential statistics – paired t -test.

Results

The obtained quantitative data were analyzed by means of descriptive statistics and t -test using computer software SPSS version 21 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp). All assumptions required to carry out t -test analyses were confirmed. The results are presented in three implicated steps. First, a postintervention change was examined in children by comparing their pretest and posttest scores in hypertension knowledge and its subscales, as shown in Table 1. Second, differences in hypertension knowledge and its subscales, adherence, and BP were examined in the adult hypertensive participants, as shown in Table 2. Third, the children's accountability of daily monitoring efforts was analyzed portrayed in Figure 1.

The results in Table 1 are of t -test analysis conducted on hypertension knowledge scores of children before and after intervention. Findings indicated a significant

knowledge enhancement in hypertension across all dimensions of HKT. The mean increase in total hypertension knowledge and its subscales is observed under mean along with a 95% confidence interval (CI) range as mentioned under lower and upper 95% CI. The Eta-squared value shows a large effect size for the total score and all dimensions except for the dimension of causes, care, and casualty awareness which showed a medium effect size.

Table 2 shows the results of *t*-test for the measures conducted on the hypertensive family members of

the children, i.e., for hypertension knowledge and its domains, hypertension compliance and its domains, and systolic and diastolic readings of BP. Inferred from the table, for hypertension knowledge, there is no significant difference observed in the adult participants. For hypertension compliance, there is a significant difference in the overall adherence but not for any particular domain. Importantly, it is seen that there is a significant change in the systolic and diastolic BP in the adult hypertensive participants. The range of overall adherence with a 95% CI is mentioned under lower and upper 95% CI.

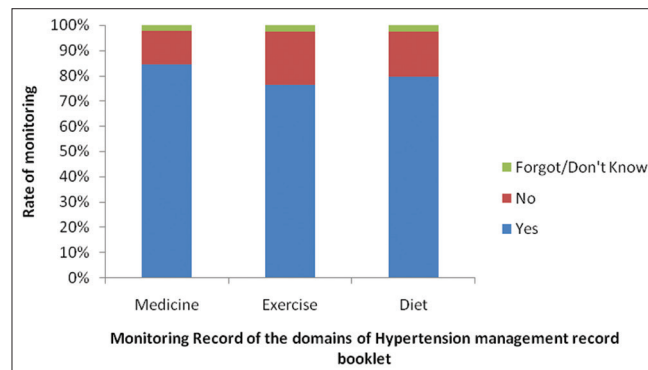


Figure 1: Percentage of monitoring efforts (medicine, exercise, and diet) in terms of "Yes," "No," and "Don't Know" for high blood pressure management by the child

Third, analysis was carried out to examine the effectiveness of children's monitoring of the compliance of adult family member with hypertension condition. Children's weekly diary responses were taken into consideration to evaluate this aspect. The records were collated for each of the basic and essential facets of hypertension management parameters, i.e., compliance to antihypertensive medicine, prescribed diet, and prescribed exercise. Successful monitoring was calculated in terms of percentage for each of the lifestyle parameter illustrated in Figure 1. "Yes" signifies the percentage of times the child reminded the paired adult and was able to support adherence; "No" indicates the number of times the child had reminded but the adult did not

Table 1: Mean, standard deviation and *t*-values of hypertension knowledge and its subscales among children participants

Outcome (n=43)	Before intervention		After intervention		95% CI for mean difference		<i>t</i>	Cohen's <i>d</i> (η^2)
	Mean	SD	Mean	SD	Lower	Upper		
Hypertension knowledge (total)	7.56	2.85	11.98	3.22	-5.54	-3.30	5.24***	1.09
General awareness	2.47	1.26	3.70	1.04	-1.71	-0.76	3.73***	0.89
Lifestyle	1.95	1.23	3.14	1.27	-1.64	-0.73	5.38***	0.77
Causes, care, causality awareness	1.53	0.96	2.33	1.25	-1.22	-0.36	7.98***	0.52
Medical management	1.60	0.93	2.81	1.20	-1.66	-0.76	5.24***	0.94

****P*<0.001. CI=Confidence interval, *r*=Correlation coefficient, SD=Standard deviation

Table 2: Mean, standard deviation and *t*-values of hypertension knowledge and its subscales, hypertension compliance, and its subscales and of systolic and diastolic blood pressure, among adult hypertensive participants

Outcome (n=43)	Before intervention		After intervention		95% CI for mean difference		<i>t</i>	Cohen's <i>d</i> (η^2)
	Mean	SD	Mean	SD	Lower	Upper		
Hypertension knowledge (total)	8.65	4.21	9.63	4.27	0.29	-1.56	1.56	0.24
General awareness	2.53	1.59	2.93	1.64	-0.88	0.09	1.66	0.26
Lifestyle	2.37	1.19	2.49	1.35	-0.47	0.24	0.66	0.10
Causes, care, causality awareness	1.88	1.98	1.16	1.10	-0.39	0.21	0.61	0.46
Medical management	1.86	1.42	2.23	1.41	-0.84	0.09	1.61	0.25
Hypertension compliance (total)	38.16	8.93	41.12	9.02	-5.38	-0.53	2.46*	0.38
Adherence to medication	18.91	6.38	20.47	6.21	-3.19	0.08	1.92	0.29
Adherence to diet	8.44	1.93	8.86	1.89	-1.14	0.30	1.17	0.18
Adherence to exercise	7.16	2.93	7.49	2.19	-1.06	0.41	0.89	0.14
Self-monitoring	3.65	2.09	4.30	1.83	-1.37	0.06	1.84	0.28
Systolic BP	153.72	18.56	138.19	11.39	11.59	19.48	7.95***	1.21
Diastolic BP	101.19	14.27	94.23	11.09	4.54	9.37	5.81***	0.89

P*<0.05, **P*<0.001. CI=Confidence interval, *r*=Correlation coefficient, SD=Standard deviation, BP=Blood pressure

comply; and “Forgot/Don’t Know” indicates the absence of monitoring. The graph in the figure tells us that children were successful in monitoring 84.44%, 79.62%, and 76.30% for antihypertensive medication compliance, exercise, and diet, respectively. They failed to monitor and record the outcome for compliance to medication, exercise, and diet 2.33%, 2.55%, and 2.55%, respectively.

Discussion

This study aimed to investigate whether children can be agents of change in hypertension management for their hypertensive adult family members. The trajectory for becoming change agents is to first equip oneself with required knowledge which helps in building the conviction and then acting upon the required change consistently to increase compliance. While children were found to have an increase in hypertension knowledge, the same was insufficient in the adult group. However, significant difference in compliance rates and BP readings of the hypertensive adults suggests the underlying influence of children in prompting the change.

Based on the results obtained, it would be appropriate to highlight the importance of the knowledge intervention provided to the children which has been indirectly dissipated in the form of good practice of hypertension control. Previous studies done on a similar age group of children have established that school children’s concept of hypertension is vague, and a number of misconceptions have been found among high school children. In a study by Hariharan *et al.*,^[25] the concept of high BP was assessed in middle and high school children between Classes 6 and 12. Only 40% of students were able to mention the causes, <10% indicated the consequences, and only about 11% hinted at the importance of management of hypertension. Thus, to strengthen the cognitive base about hypertension before assigning the children, the role of monitors of adherence in adult hypertensive family members and knowledge intervention was provided with three repeated exposures. The significant improvement in knowledge enhancement of the children indicates that the intervention was successful in providing a sound cognitive base related to hypertension.

The second objective of the study may be deemed fulfilled as the adult family member diagnosed with hypertension was found to have increased antihypertension compliance and decreased BP. These were considered the parameters to measure the success of children’s monitoring of the adult hypertension compliance. It is through the adjunct activity children were majorly successful in their responsibility of being effective reminders and insisted toward antihypertensive therapy. An

improvement in adherence is what constitutes effective disease management that leads to better prognosis. It may be argued that confounding factors may have played a role in the improved health state, although it is imperative to acknowledge the efforts of daily monitoring which would invariably build the interest of the adult in meeting their health goals.

The nonsignificant change in hypertension knowledge is of equal importance as dissipation of information by children is insinuated without having concrete evidence. This does not imply the failure of the agentic role of the child as principally the aim was to induce better compliance and not the transference of knowledge. The valuable necessitation can be summarized categorically. First, the instructions from the investigator were specific to “care giving” and monitoring the compliance of “their patients” and specifically did not include disseminating knowledge to “their patients.” Second, children might not have felt competent enough to transfer this medical knowledge to their adult family members. Finally, even if the children attempted, 72% of adult participants were illiterate and therefore may not have absorbed the information with scientific perspective. Limited literacy has been known to be one of the most significant predictors of poor hypertension knowledge and control.^[35] Reduction in BP and holistic change in adherence may suggest the persuasion skills of children in making small daily changes in the adult’s lifestyle without influencing the knowledge levels. A meta-analysis study by DiMatteo^[36] established that practical support provided in cohesive families bears the highest association with patient adherence. Another experimental finding evaluated the role of family health education to build social support for long-term management of high BP and through main effects analysis proved that family member support intervention accounted for greatest decrease in diastolic BP variability.^[37]

The findings when collaborated suggest that, with a holistic knowledge intervention, children may be assigned the responsibility to enhance clinical adherence in adults with hypertension, and they would be able to bring in the desirable change in the adherence behavior of adults, leading to better management of the disease even without knowledge enhancement in the adults. It is advocated that the adults need social support in the form of reminders, insistence, and close monitoring for optimizing adherence behavior. The fact that relationships help to bring about motivated changes in the health behavior in the absence of a cognitive base is supported by a number of theories such as relationship motivation theory,^[38] organismic integration theory,^[39] and Bandura’s^[40] agentic perspective in social cognitive theory. Furthermore, in a randomized clinical trial, it

was found that active participation from family members through home BP monitoring had better compliance rate (17% more) than simply periodic home visits by medical professionals such as nurses and pharmacists.^[41] This finding must be read in the light of the effectual contributions of active family support for sustenance of long-term compliance in the management of high BP. This management strategy is also admittedly more feasible and cost effective. Family support refers to support from any family member. It is possible that the adults in the family are quite preoccupied with their life, whereas children are found to be very perseverant, sincere, and steadfast in carrying out the responsibility entrusted on them. This can be positively exploited for any chronic illness management in adult family members.

Conclusion

First, the active involvement of children highlights a cost-effective measure of using an inherent built-in family system to manage hypertension and thereby prevent severe adversities due to nonadherence. Second, by creating a strong cognitive base in children at the right critical age, the nation will be building the future youth who would likely be vigilant in their lifestyle practices to avoid an onset of chronic illness. This perhaps is the right method of meeting the challenges of high projected rates of hypertension prevalence because they are in fact the warnings to nations to come up with proactive measures such as this to resist the hike in incidence.

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Conflicts of interest

There are no conflicts of interest.

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The Psycho-Social Support Scale (Psychoss-22) Development and Validation

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KAVYA AND PADIRI RUTH ANGIEL

The objectives of this study are to develop a self-report scale to measure social support, evaluate its core structure and study various psychometric properties in the development of this scale. The entire process of developing and validating the scale is described in three phases. These comprise item writing and content validation in Phase I, validity testing in Phase II and reliability testing in Phase III. A total of 1,414 participants were included in the study. An exploratory factor analysis was run using IBM SPSS 23. Psychometric properties of the Psycho-social Support Scale were evaluated by Cronbach's alpha index of internal reliability. The implications of the scale are discussed.

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Keywords: Psycho-social Support Scale, social support, scale development, validation

INTRODUCTION

Social support constitutes an integral part of the well-being of an individual, particularly in affiliation-oriented societies like India (Hariharan and Rath, 2008). It is measured through self-reports, as indicated by the support perceived by the respondents. The fact that perceived support positively contributes to well-being has been proved in a number of studies (Padhy and Padiri, 2020; Aydin, Kahrman and Hicdurmaz, 2017; Rani, 2016;

Gülaçtı, 2010). According to Anbazhagan and Soundrarajan (2013), lack of social support results in poor relationships with colleagues, superiors and subordinates, interpersonal conflicts and intergroup conflicts. The findings of the study by Khan (2015), revealed a positive and significant relationship between social support and life satisfaction. It was also found that social support influences life satisfaction of adolescents. In a study conducted by Padhy, Pati and Monteiro (2021), the results showed a positive correlation among mindfulness, social support and its dimensions (tangible, appraisal, and belonging), and wellbeing. The significance of social support as a contributor during illness has resurfaced prominently during the two waves of COVID-19 in India. The isolation of patients from the family and absence of support during grief are found to be traumatic for the Indian population (Hariharan, 2020).

The tool that measures social support ideally has to be holistic, assessing both the structural and functional aspects of support. The structural aspect denotes the degree to which individuals are located or integrated into a social network. These measures evaluate the existence and interconnections between different social relationships and roles. Some of the indices measuring this aspect include the size of the social network, the amount and nature of contact with the network members, type of the social relationship, density, reciprocity, strength of the ties, and so on. Functional components of social support mainly include two dimensions: what support is perceived to be available and what support is actually received. Perceived and received support have been clearly distinguished (Taylor, 2011). A scale that integrates both these aspects qualifies as a holistic tool.

It has been observed that the focus of the tools hitherto was identification of the source of support. Few of the early resources developed for evaluating social support are the Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet and Farley, 1988), Interpersonal Support Evaluation List (Cohen and Hoberman, 1983), Social Support Questionnaire (Sarason, Levine, Basham and Sarason, 1983), and the Social Support Scale (MOS-SSS) (Zanini and Peixoto, 2016). These tools by and large measure strength of the network. There are also tools that measure the functional aspects of support, that is, whether the support satisfies the emotional, material, cognitive or service needs of the individual (Cohen and others, 1985; Broadhead and others, 1988). Very often, the social support scales are developed on the basis of the sociocultural needs of the nation, which varies between developed and developing nations,

national characteristics such as individualistic or collectivistic nation, and typical need orientation such as achievement or affiliation oriented needs. India being a collectivistic society with clear affiliation orientation, needs a tool that measures social support from a national perspective. Social support in such a context is a means to an end for enhancing overall well-being in the cognitive, emotional, self-esteem, and financial dimensions, that provides psychological succour to the individual. Hence, it will be appropriate to call the tool a 'psychosocial support' scale rather than a social support scale. This paper is an attempt at developing a psychosocial tool for the Indian population. The objectives of this study are to: (i) develop a self-report scale to measure psychosocial support; (ii) evaluate its core structure; and (iii) study various psychometric properties in the development of this scale.

Tool Development

Development and Validation of the Psycho-social Support Scale

The entire process of developing and validating the scale is described in three phases: item writing and content validation (Phase I); validity testing (Phase II); and reliability testing (Phase III).

Item Development (Phase I): The goal in this phase was to generate items to form a conceptually sound scale. A thorough evaluation of the literature was conducted to identify previously constructed scales of social support. Items from the scales along with the researchers' personal observations and experiences were utilised in preparing 42 items for primary assessment. The list of items were incorporated into a scale version and submitted to a panel of eight experts in Psychology for checking the content validity. After the items were rated by the professional panel, two items were rejected and the final version was retained with '40' items.

Content Validity Index of the Scale: The statements of the scale were rated on a 5-point Likert Scale (strongly agree (5) to strongly disagree (1)). The items with negative statements were scored in reverse order, that is, strongly agree (1) and strongly disagree (5). The quantitative content validity was computed based on the Content Validity Index (CVI) given by Waltz and Bausell (1983). The expert panel rated each item in terms of relevance, clarity, simplicity and ambiguity. Each of these assessment categories were divided into four descriptions with an indicative numerical

score (Table 1). The expert panel were asked to rate each item in the scale as specified in the CVI numerical categorisation. The following table illustrated the CVI categorisation of the 4 point ratings.

Table 1: Criteria for Measuring Content Validity

Scores/ Characteristics	1	2	3	4
Relevance	Not relevant	Item needs some revision	Relevant but needs minor revision	Very relevant
Clarity	Not clear	Item needs some revision	Clear but needs minor revision	Very clear
Simplicity	Not simple	Item needs some revision	Simple but needs minor revision	Very simple
Ambiguity	Doubtful	Item needs some revision	No doubt but needs minor revision	Meaning is clear

The ratings of the experts were computed for both item level Content Validity Index (I-CVI) and scale level Content Validity Index (S-CVI). Proportions have been used to calculate CVI for each item as well as the whole instrument.

The CVI of each item was determined as the proportion of judges who had evaluated an item as 'valid', that is, obtaining a score of 4 or 5 for the item (Drost, 2011; Polit and Beck, 2006). The content validity of the instrument with respect to the four parameters was then determined as a proportion of items which had a CVI of 0.75 to 1.00 (Drost, 2011). Therefore, the items that had a CVI of over 0.75 were retained in the scale. The expert evaluation yielded the content validity of the scale on the basis of relevance, clarity, and ambiguity at the Item Level and the Scale Level to be 39.2 (I-CVI) and .98 (S-CVI), respectively (S-CVI = Average of the I-CVIs, sum of ratings and division by the number of items = $39.4/40=.98$). The content validity of the scale on the basis of simplicity at the Item Level and the Scale Level were 39.6 (I-CVI) and .99(S-CVI), respectively. Yaghmale (2003) has posited that a CVI of 0.80 or higher is acceptable and considered sufficient. Since the CVI for all the components was more than 0.80, the instrument was considered to have good content validity.

Validation of the Psycho-social Support Scale (Phase II): After completing the standard initial phase for scale development, Exploratory Factor Analysis (EFA) was used to identify the internal structure of the set of items of the Psycho-Social Support Scale and to group these items into factors.

RESEARCH METHODOLOGY

Participants

The sample selection was undertaken in two levels. The listing of public and private educational institutions (high schools, colleges, universities) in Hyderabad was done in the first level. The management of these institutions were requested to participate in the study. Five high schools, two junior colleges, one undergraduate college, and one university which responded, were included in the first level of the sample. These institutions catered to students of all socioeconomic backgrounds. In the second level the participants were included. All the students of the class from classes 6 to 12 in high school and classes 11 and 12 from junior colleges were included in the sample. The students present in the class on the day of data collection constituted the sample. Students of the undergraduate college and the University residing in the hostels and willing to participate in the study were included in the sample. Informed consent forms (for participants 18 years or above and parents of the students less than 18 years) and informed assent forms (for students less than 18 years) were administered. The participants were read out the ICF/IAF and encouraged to pose queries, if any. The initial sample consisted of 1,496 students from class 6 to postgraduation. The age range was found to be 12–23 years. In the process of data cleaning, a total of 57 participants had to be dropped due to incomplete data. Again, another 25 outliers were found. They were dropped. Finally, a total of 1,414 participants were included as the final sample. The mean age of the total sample is 15.07 and SD is 1.60. The sample consisted of 784 males (mean age= 15.44, SD=1.75) and 630 females (mean age= 14.61, SD=1.23).

Measures

Two standardised scales were used for establishing the Criterion validity of the Psychosocial Support Scale: Multidimensional Perceived Social Support Scale (MSPSS), which is widely used in social support research, and

the Brief Inventory of Thriving (BIT), which measures the psychological well-being. The scales are described in detail. Sociodemographic information constituted the first part of the scale. The scales used in the study were in the English language, as that is the medium of instruction in all the selected institutions.

Multidimensional Scale of Perceived Social Support

This measure was developed by Zimet, Dahlem, Zimet and Farley (1988) and consists of 12 items with responses based on a 7-point Likert Scale. The ratings range from 1 (Very Strongly Disagree) to 7 (Very Strongly Agree). It measures social support from three sources: significant others; family; and friends. Each of the source dimensions consisted of four items. The total social support is found by summing-up the scores of the 12 items. The higher the score, higher is the level of social support. The MSPSS is suitable for populations across all age groups and different education levels. The Cronbach's alpha level of the MSPSS for this study was found to be 0.85.

Brief Inventory of Thriving

The Brief Inventory of Thriving (BIT) (Su, Tay and Diener, 2014) was used to measure the status of psychological well-being of the participants. The BIT has 10 items in total, measuring 6 of the 7 core psychological well-being dimensions (positive relationships, engagement, mastery, meaning, optimism and subjective well-being). The responses for each item were in the form of a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher mean score indicates higher well-being. The BIT assesses 10 facets of positive functioning and human flourishing in hedonia and eudaimonia, including life satisfaction, positive emotion, support, belonging, meaning, engagement, self-worth, self-efficacy, accomplishment, and optimism. BIT exhibits excellent psychometric properties. High internal consistency with reliability coefficients over 0.90, and test-retest reliability of 0.83 was reported. The Cronbach's alpha level of the BIT for this study was found to be 0.82.

Procedure

Using a purposive sampling method, participants were recruited from Hyderabad, India. The participants were briefed about the study being conducted and they were asked to sign the consent forms, if they agreed to participate in the study. The selected participants took part in this study

individually as well as in groups. They were asked to read the written instructions on the scales and answer accordingly. The obtained quantitative data were analysed by using IBM SPSS Statistics 23 for analysis.

RESULTS

Exploratory Factor Analysis

The 40 items of the Psycho-social Support Scale were subjected to Exploratory Factor Analysis (EFA). The maximum likelihood (ML) extraction method, followed by the direct oblimin (oblique) rotation method to allow for correlation between the factors were used. The sample was first evaluated for its suitability for factor analysis. Bartlett's Test of Sphericity (Bartlett, 1954) was highly significant ($p < .001$) and the Kaiser—Meyer—Olkin (KMO) Measure of Sampling Adequacy value was .87. This supported the factorability of the matrix (Tabachnick and Fidell, 2013). Communalities are presented in Table 2. Item Nos. 2,6,7,13, 14,15,17,19,20,22,23,24,28,29,36,39 (Total 17 items) having communality values lower than .30 were deleted from the scale in order to increase the total variance explained.

Table 2: Communalities for Items of 40-item Psycho-social Support Scale

Social Support Scale Items: Original Item Number	Communalities	
	Initial	Extraction
1	.158	.152
2	.198	.221
3	.331	.518
4	.099	.111
5	.244	.337
6	.114	.148
7	.203	.216
8	.323	.435
9	.369	.514
10	.407	.558
11	.286	.326
12	.297	.316
13	.170	.249
14	.153	.196
15	.172	.174

Social Support Scale Items: Original Item Number	Communalities	
	Initial	Extraction
16	.236	.323
17	.175	.220
18	.208	.310
19	.113	.158
20	.147	.171
21	.259	.357
22	.194	.285
23	.138	.184
24	.102	.143
25	.237	.334
26	.269	.433
27	.210	.316
28	.167	.208
29	.225	.284
30	.308	.373
31	.301	.601
32	.234	.360
33	.334	.463
34	.269	.310
35	.306	.618
36	.192	.256
37	.277	.317
38	.214	.328
39	.147	.210
40	.224	.356

Removing the 17 items, the EFA was again run to originate new solutions with the final 23 items of the scale. The same extraction and rotation methods were used. The Bartlett's Test of Sphericity was highly significant ($p < .001$) and the KMO Measure of Sampling Adequacy value was .84, above the recommended value of 0.6 (Kaiser, 1970; 1974). The sample was suitable for running the factor analysis for the validation of the scale. The item number 12 was excluded due to small factor loading. Hence, the final scale consisted of 22 items. The means, standard deviations and inter-item correlation matrix for these 22 items are presented in Table 3. On a five-point scale, where 1 = strongly disagree to 5 = strongly agree, the means ranged from 3.47 (Item 18) to 4.28 (Item 10). Examination

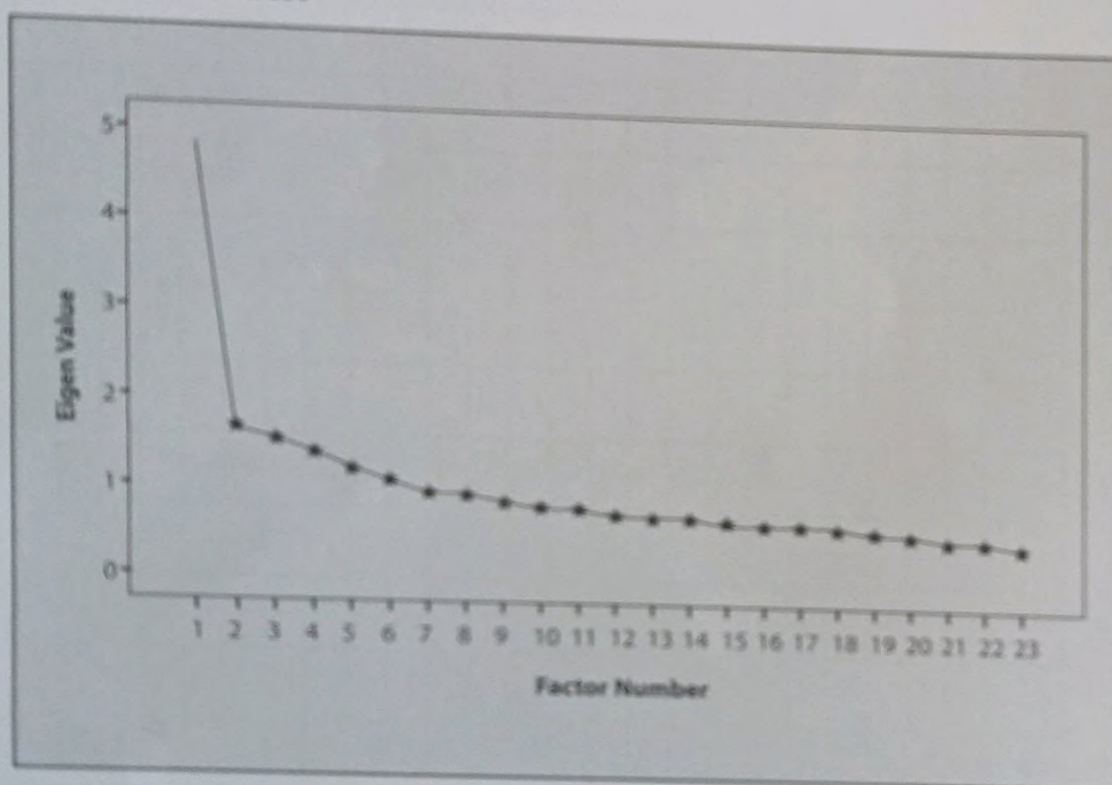
Table 3: Correlation Matrix, Means and Standard Deviations for Psycho-social Support Scale

Items	3	4	5	8	9	10	11	12	16	18	21	25	26	27	30	31	32	33	34	35	37	38	40
3	1																						
4	.35	1																					
5	.24	.24	1																				
8	.47	.24	.17	1																			
9	.16	.15	.15	.17	1																		
10	.20	.20	.20	.19	.53	1																	
11	.25	.27	.16	.23	.35	.40	1																
12	.26	.23	.26	.25	.24	.27	.36	1															
16	.20	.08	.09	.18	.01	.06	.09	.10	1														
18	.04	.12	.09	.03	.25	.23	.16	.17	.07	1													
21	.26	.22	.12	.26	.16	.20	.20	.25	.14	.08	1												
25	.14	.11	.06	.15	.13	.15	.12	.08	.25	.04	.08	1											
26	.23	.17	.12	.20	.17	.21	.21	.21	.16	.06	.30	.28	1										
27	.05	.09	.13	.05	.15	.19	.14	.14	.02	.12	.12	.11	.10	1									
30	.26	.21	.17	.29	.22	.25	.25	.27	.13	.14	.32	.13	.33	.13	1								
31	.10	.06	.15	.14	.14	.14	.14	.23	.09	.04	.10	.09	.05	.31	.15	1							
32	.18	.09	.05	.14	.10	.15	.11	.10	.17	.04	.12	.27	.18	.21	.13	.17	1						
33	.20	.16	.11	.21	.12	.14	.20	.21	.12	.04	.20	.14	.19	.30	.23	.44	.33	1					
34	.20	.24	.26	.14	.10	.18	.18	.23	.10	.07	.17	.13	.20	.05	.24	.19	.05	.17	1				
35	.21	.17	.23	.17	.22	.22	.21	.25	.12	.10	.18	.10	.21	.08	.29	.18	.09	.18	.40	1			
37	.18	.16	.26	.22	.19	.21	.19	.24	.14	.13	.23	.11	.17	.14	.23	.22	.10	.18	.26	.34	1		
38	.12	.04	.16	.08	.06	.08	.08	.07	.16	.10	.13	.13	.07	.03	.02	.02	.18	.03	.12	.09	.21	1	
40	.16	.14	.35	.12	.15	.02	.12	.17	.06	.10	.09	.07	.14	.04	.17	.11	.02	.10	.25	.25	.29	.17	1
M	4.18	4.06	4.13	4.23	4.23	4.28	4.23	4.20	3.86	3.47	4.03	3.55	3.93	3.76	3.73	3.84	3.55	3.94	3.96	3.95	4.17	3.60	4.06
SD	.97	.97	4.06	1.01	.94	.90	.94	.95	1.38	1.45	1.06	1.41	1.14	1.38	1.14	1.13	1.40	1.20	.96	1.03	.86	1.34	1.03

of the correlation matrix indicated that the majority of the correlation coefficients were .3 or above. No inter item correlation exceeded $r = .63$, thus showing no problems with multi collinearity.

Two criteria were used to determine factor extraction, such as the scree plot and Kaiser's eigen value >1 . The scree plot (Figure 1) and Kaiser's eigen value >1 criterion gave rise to the extraction of six factors. From Table 4, it was observed that the Factor 1, 2, 3, 4, 5, and 6 accounted for 20.92 percent, 7.19 percent, 6.68 percent, 6.05 percent, 5.21 percent, and 4.61 percent respectively, of the explainable variance. That is, 50.66 percent of the total variance is explained by these six factors. The factor solution converged in 14 iterations within a simple structure. The correlation coefficients (r) between factors ranged from .02 to .41. Each item loaded .30 or higher on its expected factor. The Psycho-social Support Scale items, pattern coefficients (factor loadings), along with percentage of explained variance is presented in Table 4.

Figure 1: Scree Plot



After the identification of the six factors from the 22 items of the Psychosocial Support Scale based on the EFA, factors were named as per their contents. Factor 1 was labelled 'social support network'. The three items are: "I believe I will remain close to my friends for a long time";

Table 4: Pattern Matrix for Maximum Likelihood with Oblimin Rotation of Six Factor Solution of Psycho-social Support Scale

Original Item Number	1	2	3	4	5	6
3	.779					
8	.588					
4	.395					
12						
10		.718				
9		.708				
11		.407				
18		.321				
33			.670			
31			.651			
27			.453			
40				.539		
34				.495		
5				.467		
35				.464		
37				.458		
25					.460	
32					.424	
38					.382	
16					.315	
26						.488
30						.417
21						.316
Percentage of explained variance	20.92	7.19	6.68	6.05	5.21	4.61

Note. Extraction method: maximum likelihood; rotation method: Oblimin with Kaiser normalisation, rotation converged in fourteen iterations.

"I can go to my friends when I need advice"; and "I have long lasting friendships".

It may be observed that the three items loading within this factor emphasises the structural aspect of social support that refers to the size and types of social relationships, as well as the dependency upon it, in terms of frequency of contact with intimate friends, relatives and family members. The role of one's social network is to provide a sense of belonging, assurance of being loved, and cared for. It accounts for the quantitative perception of relationship integration, indicating the perceived variety of individuals or positive dependency established with one's contact, who would be readily available in a crisis.

Factor 2 is labelled as 'family based psychosocial support'. It comprises four items loaded within this factor highlighting the psychosocial support received from one's own parents or family members. The items are: "My parents/family members support my decisions"; "My parents/family members understand my needs"; "I am encouraged by my friends and family to follow my dreams"; and "My parents give me pocket money". Broadly, the items emphasise the functional aspect of support that emerges from the microsystemic framework of intimate social relationships that directly contributes to human development (Bronfenbrenner, 1979).

Factor 3 is labelled 'communicative support'. The three items loaded within this factor reflect the support of positive exchange of verbal and nonverbal communication that not only reduce uncertainty but enhances certainty and raise personal control, which is relevant in personal crises and everyday engagements (Albrecht and Adelman, 1987; Barnes and Duck, 1994). The items under this factor are "My loved ones celebrate my achievements"; "I express appreciation to others help"; and "There are several people whose company I enjoy".

Factor 4 with five items was labelled 'supportful disposition'. The items are: "I help others without expecting anything in return"; "I provide support as long as one needs"; "Once I start supporting others I continue giving support"; "I provide help to others if someone needs"; and "I help others without any expectations". The five items loaded within this factor focused on the support one extends to others without expecting to get something in return. It mainly focuses on the unconditional positive support and the individual's participation in various support activities. This factor renders slightly from the concept of instrumental support of providing concrete direct social support with an enhanced sense of giving, caring, and belonging, marked by the action of 'giving' rather than 'receiving'.

Factor 5 was labelled 'psychological support deprivation'. The factor comprises of items: "I don't have friends to spend time with"; "I feel lonely even in the presence of friends and family"; "There is no one I feel comfortable to discuss my personal problems"; and "I help people to get something in return". All the four items loaded within this factor emphasised the lack of social support. This factor may yield a strong argument from basic motivational theories, which clearly illustrate that need for affiliation as a prime motive in all individuals. This factor may also be construed in terms of a need for belonging that is secured with polarised groups compatible with similar beliefs, needs, motives and affinity towards each other.

Factor 6 is labelled 'psychosocial support availability', as all the three items loaded within this factor reflected the availability of social support an individual seeks. The items refer to: "There is someone to accompany me when I need them"; "There are people to listen to me when I need to talk"; and "When I feel lonely several people come forward to be with me".

This factor underlines the readiness associated with social networks available to the individual who is on the 'receiving' end. This dimension captures the global availability of social resources in the rise of an adversity which generates a reassurance of the available assistance and help.

Establishing Reliability Coefficients and Construct Validity (Phase III)

Reliability Coefficients

Subscale scores were calculated by adding the scores of the items from each factor that the participant responded. Psychometric properties of the Psycho-social Support Scale were evaluated by Cronbach's alpha index of internal reliability. The reliability coefficients were between .49 and .79 (Table 5). The internal consistency of the entire set of 22 items ($\alpha = .79$) was higher than that of the individual subscales ($\alpha = .62$ for social support network, .60 for family based psychosocial support, .61 for communicative support, .67 for supportful disposition, .49 for psychological support deprivation, and .58 for psychosocial support availability). The lowest coefficient was reported by the factor that described the psychological support with four items.

Table 5: Reliability Coefficients in Each Factor

Factor	No. of Items	Alpha Coefficient
1. Social support network	3	.62
2. Family based psychosocial support	4	.61
3. Communicative support	3	.61
4. Supportful disposition	5	.67
5. Psychological support deprivation	4	.49
6. Psychosocial support availability	3	.58
Psycho- social support	22	.79

Construct Validity

The construct validity was examined on the basis of the associations between the Psycho-social Support Scale and perceived social support and well-being scales. In the line of the previous research, a positive association between psycho-social support, perceived social support, and well-being were noted. As observed in Table 6, the correlations were significant (moderate; ranging from absolute .50 to .52) and in the predictable directions, supporting the construct validity of the Psycho-social Support Scale.

Table 6. Bivariate Correlations between Psycho-social Support and its Dimensions, Perceived Social Support, and Well-being (N= 1414)

Variable	Perceived Social Support	Well-being
Psycho-social support	.51**	.48**
Social support network	.39**	.28**
Family based psychosocial support	.34**	.39**
Communicative support	.24**	.26**
Supportful disposition	.32**	.34**
Psychological support deprivation	.25**	.19**
Psychosocial support availability	.44**	.37**

Note: **p < .01.

DISCUSSION

The aim of the present study was to develop a new global self-report psychosocial support scale. Based on the theoretical definitions of social support, we anticipated the Psycho-social Support Scale to measure several domains of the construct. A six-factor structure—social support

network, family based psychosocial support, communicative support, supportful disposition, psychological support deprivation, psychosocial support availability was identified to develop this new scale called Psycho-social Support Scale (Psychoss-22). This scale can be used as a diagnostic tool. The multidimensionality of the psycho-social support offers fascinating possibilities for offering intervention (See Appendix). For example, the diversity of factors measured by the Psychoss-22 may be useful in understanding specific social support needs of an individual. This enables mobilisation of interventions for the specific domains of social support. Clinical interventions may also be tailored to address the gap in psychosocial support. Further research is encouraged in this direction that will isolate social support needs and its interaction with other psychosocial characteristics.

CONCLUSION

The short form and the simple language used in the scale are a definite advantage for feasibility of administration across age groups and educational levels. The scale can be administered individually or in groups, in both clinical and non-clinical settings. To mention a few, it can be administered either by the practicing psychologists or researchers on the specific age group population having issues with relationships, adjustment, or any specific psychological conditions like body image or eating disorders. It can even be administered on those grieving the loss of their dear ones or among those who have faced natural disasters. It is highly relevant for use during the COVID-19 situation, where the family members and friends are placed in isolation or quarantine due to the viral infection. As the scale measures different aspects of the essential variable of psycho-social support, the applicability of the instrument is vast and significant.

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APPENDIX
PSYCHO-SOCIAL SUPPORT SCALE (PSYCHOSS-22)

Name: _____ Age: _____ Gender: _____

School/College/ Organisation _____ Government/ Private _____

Class: _____ Years of Experience: _____ CGPA/Percentage: _____

Instructions: "Listed below are a few statements. Kindly read them carefully and respond appropriately by giving information regarding the support. You need to read each statement and select by putting a tick (ü) on response from the five options mentioned in columns. For example, For each of the following statements, please tick (ü) in only one box that describes you the best. Please read each sentence carefully and answer honestly".

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

Sl. No.	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	I believe I will remain close to my friends for a long time	1	2	3	4	5
2.	I can go to my friends when I need advice	1	2	3	4	5
3.	I help others without expecting anything in return	1	2	3	4	5
4.	I have long lasting friendships	1	2	3	4	5
5.	My parents/family members support my decisions	1	2	3	4	5
6.	My parents/family members understand my needs	1	2	3	4	5
7.	I am encouraged by my friends and family to follow my dreams	1	2	3	4	5
*8.	I don't have friends to spend time with	1	2	3	4	5
9.	My parents give me pocket money	1	2	3	4	5
10.	There is someone to accompany me when I need them	1	2	3	4	5
*11.	I feel lonely even in the presence of friends and family	1	2	3	4	5

Sl. No.	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
12.	There are people to listen to me when I need to talk	1	2	3	4	5
13.	My loved ones celebrate my achievements	1	2	3	4	5
14.	When I feel lonely several people come forward to be with me	1	2	3	4	5
15	I express appreciation to others help.	1	2	3	4	5
*16	There is no one I feel comfortable to discuss my personal problems	1	2	3	4	5
17	There are several people whose company I enjoy	1	2	3	4	5
18.	I provide support as long as one needs	1	2	3	4	5
19.	Once I start supporting others I continue giving support	1	2	3	4	5
20.	I provide help to others if someone needs	1	2	3	4	5
*21.	I help people to get something in return	1	2	3	4	5
22.	I help others without any expectations	1	2	3	4	5

*Reverse scoring

Factor 1. Social support network (Items 1, 2, 4)

Factor 2. Family based psychosocial support (Items 5,6,7,9)

Factor 3. Communicative support (Items 13, 15,17)

Factor 4. Supportful disposition (Items 3,18,19,20,22)

Factor 5. Psychological support deprivation (Items 8,11,16,21)

Factor 6. Psychosocial support availability (Items 10,12,14)

Psycho- social support (All 22 Items)



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Enhancing adherence and management in patients with hypertension: Impact of form and frequency of knowledge intervention

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ABSTRACT

Background: The alarming rise in prevalence of hypertension warrants psychosocial methods supplementing pharmacotherapy for better management and prevention of cardiac emergencies. The objective of the study was to assess the differential impact of the form and frequency of knowledge intervention on management of primary hypertension.

Materials and method: The study was conducted on 256 hypertensive patients recruited through purposive sampling at health centers in Hyderabad, India. Pretest post-test control group quasi-experimental design was adopted for the study. There were two forms of the knowledge intervention, namely 'Direct Interaction' and 'Audio-Visual'. Each form was presented in two frequencies namely 'single exposure' and 'double exposure'. The four groups were labelled as Direct Intervention Single (DIS), Direct Intervention Double (DID), Audio-Visual Single (AVS) and Audio-Visual Double (AVD). Adherence and management of hypertension were assessed at baseline and six weeks post experiment. Analysis of Covariance (ANCOVA) was applied using IBM SPSS Statistics version 20.

Results: ANCOVA followed by Bonferroni Multiple Group Comparison Test revealed significant differences between the four intervention groups and control group on adherence ($p < .001$). In case of hypertension management significant differences were observed between Control group and DIS, DID ($p < .001$), Control and AVS ($p < .01$). Control group did not differ from AVD.

Conclusion: There was a positive impact of Knowledge Intervention on adherence and management of hypertension. Double exposure in audio visual form was counterproductive in hypertension management.

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1. Introduction

Recent years have witnessed a humongous escalation in the prevalence of hypertension. One in three adults is affected by the

condition globally.¹ Uncontrolled hypertension has been found to result in 24% of acute myocardial infarction, 21% peripheral vascular diseases and 16% ischemic heart diseases.² Effective management of hypertension demands a shift in lifestyle. Research evidence suggests that hypertensive patients have inadequate knowledge about the condition in regard to blood pressure readings,³ nature of hypertension, importance of regular medication,⁴ seriousness of uncontrolled hypertension,⁵ and the importance of management.⁶ Educating patients on lifestyle management can be effectively carried out by Health Psychologists with the assistance of nursing professionals as major lifestyle changes depend upon health behavior modification.

Abbreviations: DI, Direct Interactions; DID, Direct Interaction Double; DIS, Direct Interaction Single; AVD, Audio Visual Double; AVS, Audio Visual Single; HKT, Hypertension Knowledge Test; HyCompS, Hypertension Compliance Scale; MAP, Mean Arterial Pressure; ANCOVA, Analysis of Covariance.

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Previous studies have proved the positive impact of knowledge in hypertension control.^{7–9} Knowledge intervention has been found to improve medication adherence and lifestyle behaviors and thereby significantly decreased blood pressure levels.^{10,11}

Although the existing literature confirms the positive impact of knowledge intervention, comparison of the forms and frequencies of the intervention; and their differential impacts on adherence and management were not the focus. The present study attempts to fill this gap.

The objective of the study is to measure the differential impact of knowledge intervention in two forms and frequencies on adherence and management of hypertension.

2. Method

2.1. Study setting

The study design and procedure were approved by the institutional ethics committee of the University of Hyderabad (Approval Number UH/IEC/2014/22 dated 08th September 2014).

This quasi-experimental study was conducted in Hyderabad, India by adopting a pre-test post-test non-equivalent group design that consisted of five groups. Group 1 and Group 2 received Knowledge Intervention in Direct Interaction (DI) form, where a qualified doctor explained hypertension related knowledge directly to the participants. Group 3 and Group 4 received Knowledge Intervention in video form. While Groups 1 and 3 were exposed to the Knowledge Intervention only once, Groups 2 and 4 were exposed to repeated inputs (twice) in a gap of 15 days. Group 5 was the control group that received only standard medical care.

2.2. Participants

Participants were recruited based on inclusion criteria: a) the patients have been diagnosed with primary hypertension for at least a year; b) the patients expressed willingness by signing the informed consent form. The patients were excluded from the study if they were diagnosed with secondary hypertension or any associated illness such as diabetes mellitus, thyroid, and arthritis. After screening 1050 participants based on purposive sampling, a total of 450 were recruited. Using serial assignment method, this sample was allotted to one of the five groups. After sample attrition and removal of outliers 256 participants continued till the end of the study.

The sample consisted of 53.3% men and 46.7% women with age ranging between 30 and 65 years ($M = 52.2$, $SD = 8.31$). The mean duration of illness was 5.42 years ($SD = 5.07$). The sample consisted of persons with primary education (18.8%) high school (17.6%), intermediate (27.3%), graduates (24.2%) and professionally educated (12.1%).

2.3. Tools

The baseline and follow up assessments were carried out by using the following tools *Hypertension Knowledge Test (HKT)*: This is a 22-item multiple choice test of knowledge about hypertension. The knowledge is measured among four domains: general awareness; lifestyle factors; causes, care and casualty awareness; and medication management. The test-retest reliability was found to be .92 ($p < .001$). The construct validity with systolic blood pressure readings was found to be $-.28$ ($p < .001$) diastolic blood pressure at $-.22$ ($p < .001$).¹²

Hypertension Compliance Scale (HYCOMPS): This is a 15-item scale with a 4-point response measure. It has four domains viz

adherence to medication, diet, exercise and self-monitoring. The Cronbach's α was found to be .67¹³

Blood pressure recording: The patients' blood pressure reading was measured between 10 and 11 a.m. by a standard mercury sphygmomanometer and converted into the Mean Arterial Pressure (MAP) using the standard formula.

Knowledge Intervention: The contents for knowledge intervention were structured taking salient points from Joint National Committee's (JNC-8) guidelines. It was validated by a team of three experts comprising of a cardio-thoracic surgeon, general physician and a medical scientist. The script was the same for direct and audiovisual presentation, the duration of which was 30 min.

2.4. Procedure

On their arrival the participants were requested to relax for 15 min before the first reading of B.P. was taken. They were seated comfortably with back support and the participants arm was supported at the heart level. Three B. P. readings were taken within a gap of 5 min between each reading. The mean value of the three readings was recorded. Participants were administered the Hypertension Knowledge Test and Hypertension Compliance test (pretest). The recruited participants were then assigned to the five groups in a sequential manner. Out of 256 participants, 50 participants were in Direct Interaction Double (DID) group, 51 in Direct Interaction Single (DIS) group, 51 in Audio Visual Double (AVD) group, and 51 in Audio Visual Single (AVS) group while 53 were in Control group.

The participants in groups of 30 or less were exposed to the interventions. The DID group were exposed to an intervention where the physician presented the content to the group through power point presentation. This was repeated for a second time within a gap of 15 days. The DIS group was exposed to the presentation by the physician only once. The AVD group was exposed to the audiovisual presentation of contents twice with a gap of 15 days while the AVS group was exposed to the intervention only once. The participants were administered HKT and HyCompS post intervention. Their blood pressure was measured in the 6th week after exposure to the intervention.

2.5. Statistical analyses

Data was analyzed using the IBM SPSS Statistic 20.0 version. The study being a pretest posttest design, the Analysis of Covariance (ANCOVA) was used for the purpose of controlling the effect of pre-intervention scores on the post intervention scores. The corresponding pre-intervention score of the variable was considered as the covariate.

3. Results

The five groups were compared on their post-test knowledge, adherence, and hypertension management using Analysis of Covariance (ANCOVA). Separate ANCOVAs were carried out to find the differences among the five groups post intervention on knowledge and its four dimensions, adherence and its four dimensions, and mean arterial pressure readings. Multiple group comparison was carried out using the Bonferroni method. The levels of significance are mentioned in the table.

3.1. Impact of intervention on adherence

Tables 1 and 2 presents the results of ANCOVA and Bonferroni Multiple Group Comparisons on the overall adherence and its four dimensions in the post intervention test on the five groups.

Table 1Results of one-way ANCOVA with estimated marginal means, standard errors, effect sizes (η^2) for post-intervention adherence and its variables.

Groups	Means (Standard Errors)					$F(4,250)$	η^2
	DIS	DID	AVS	AVD	Control		
Adherence Overall	49.72 (.84)	51.68 (.83)	47.75 (.83)	47.57 (.83)	37.97 (.81)	41.36***	.39
Medication	26.23 (.53)	26.67 (.53)	25.85 (.53)	25.16 (.53)	20.07 (.52)	26.23***	.29
Diet	11.45 (.09)	11.78 (.09)	10.94 (.23)	11.08 (.23)	8.25 (.23)	36.22***	.36
Exercise	7.36 (.25)	8.03 (.25)	7.57 (.25)	7.87 (.25)	6.32 (.25)	7.11***	.10
Self – monitoring	4.65 (.21)	5.20 (.21)	3.40 (.21)	3.45 (.21)	3.32 (.20)	16.58***	.21

Note. DIS = Direct Interaction Single, DID = Direct Interaction Double, AVS = Audio Visual Single, AVD = Audio Visual Double; * = $p < .05$, ** = $p < .01$, *** = $p < .001$.**Table 2**

Results of Bonferroni multiple Group comparisons on adherence and its dimensions.

Multiple comparisons	HyCompS Overall	HyCompS-Medication	HyCompS-Diet	HyCompS-Exercise	HycompS-Self-Monitoring
DIS ~ DID	-1.95	-.44	-.32	-.66	-.54
DIS ~ AVS	1.97	.37	.51	-.21	1.25***
DIS ~ AVD	2.15	1.06	.36	-.51	1.19**
DIS ~ Control	11.75***	6.15***	3.20***	1.04*	1.33***
DID ~ AVS	3.93*	.81	.84	.45	1.80***
DID ~ AVD	4.11**	1.50	.69	.15	1.74***
DID ~ Control	13.71***	6.60***	3.53***	1.70***	1.87***
AVS ~ AVD	.18	.69	-.14	-.29	-.05
AVS ~ Control	9.78***	5.78***	2.69***	1.25**	.07
AVD ~ Control	9.59***	5.09***	2.83***	1.55***	.13

Note. DIS = Direct Interaction Single, DID = Direct Interaction Double, AVS = Audio Visual Single, AVD = Audio Visual Double; HyCompS = Hypertension Adherence.

* = $p < .05$, ** = $p < .01$, *** = $p < .001$.

It is inferred from Table 1 that there are significant differences between the groups on Overall Adherence $F(4,250) = 41.36$, $p < .001$, Adherence to Medication $F(4,250) = 26.23$, $p < .001$, Adherence to Diet $F(4,250) = 36.22$, $p < .001$, Adherence to Exercise $F(4,250) = 7.11$, $p < .001$, and Self-Monitoring $F(4,250) = 16.58$, $p < .001$.

It is observed from Table 2 that the Control Group significantly differed from all the intervention groups on overall adherence, Adherence to Medication, Diet and Exercise. Further both the direct interaction groups significantly differed from the audio-visual groups on the dimensions of self-monitoring. A detailed scrutiny of the mean scores from Table 2 broadly gives an impression that the DID Group had a higher level of Overall Adherence and its dimensions. A further examination revealed that DID Group did not significantly differ from DIS Group on Overall Adherence and its dimensions. However, DID Group scored significantly higher on Overall Adherence ($M = 51.68$, $SE = 0.83$) compared to AVS ($M = 47.75$, $SE = .83$, $p < .05$) and AVD ($M = 47.57$, $SE = .83$, $p < .01$). Similarly, DID Group was found to have higher level of Adherence ($M = 5.20$, $SE = .21$) compared to AVS ($M = 3.40$, $SE = .21$, $p < .001$) and AVD ($M = 3.45$, $SE = .21$, $p < .001$) on Adherence to self-monitoring. The DIS Group scored significantly higher on self-monitoring ($M = 4.65$, $SE = .21$) compared to AVS Group ($M = 3.40$, $SE = .21$, $p < .01$) and AVD Group ($M = 3.45$, $SE = .21$, $p < .001$).

3.2. Impact of intervention on management of hypertension

Tables 3 and 4 present the results of ANCOVA and Bonferroni multiple group comparison on hypertension management measured by Mean Arterial Pressure (MAP) readings of the five groups in the post intervention phase.

It is inferred from Table 3 that there are significant differences between the groups reflected in post intervention mean arterial pressure readings $F(4,250) = 41.36$, $p < .001$. Table 4 suggests that

Table 3Results of one-way ANCOVA with estimated marginal means, standard errors, effect sizes (η^2) for post-intervention hypertension management (mean arterial pressure readings).

Groups	Means	Standard Errors	$F(4,250)$	η^2
DIS	98.42	.53	15.31***	.19
DID	96.94	.52		
AVS	99.83	.52		
AVD	100.28	.52		
Control	102.36	.51		

Note: 1. Covariate was evaluated at pretest controlled mean value of 104.07.

2. *** $p < .001$.**Table 4**

Results of bonferroni multiple group comparisons on blood pressure readings.

Multiple comparisons	Hypertension Management (Blood Pressure Readings)
DIS ~ Control	3.94***
DID ~ Control	5.42***
AVS ~ Control	2.53**
AVD ~ Control	2.08
DID ~ AVS	2.88**
DID ~ AVD	3.34***
AVS ~ AVD	.45
DIS ~ DID	1.48
DIS ~ AVS	1.40
DIS ~ AVD	1.85

Note. DIS = Direct Interaction Single, DID = Direct Interaction Double, AVS = Audio Visual Single, AVD = Audio Visual Double; ** = $p < .01$ *** $p < .001$.

the Control Group significantly differed from all other groups except the AVD Group in managing the blood pressure on post intervention phase. Further, it is also observed that the group exposed to DID showed a significant lower level of mean arterial pressure ($M = 98.42$, $SE = .53$) compared to the group exposed to AVS ($M = 99.83$, $SE = .52$, $p < .01$) and AVD ($M = 100.28$, $SE = .52$, $p < .001$).

4. Discussion

The findings of the study clearly indicated the positive impact of knowledge interventions not only in improving adherence but also in effective management of hypertension in patients. The results revealed the efficacy of the direct interaction compared to audio-visual form. Findings clearly indicated the positive role of repeated exposure only in direct interaction and its counterproductive impact in audio visual double form.

4.1. Impact of form and frequency on Adherence behavior

The results clearly indicated that all intervention groups showed higher level of overall adherence and specifically in adherence to medication, diet, and exercise compared to the Control Group. This clearly suggests that cognitive base created by exposure to hypertension knowledge translated into strengthening positive behaviour related to clinical adherence. A number of studies have established a positive relationship between communication and adherence,^{13,14} information exposure and adherence,¹⁵ group orientation and adherence.¹⁶ It may be relevant to state here that only when the communication packed in intervention suits the target groups in its content, medium (language) and form will it have an effective outcome that is intense enough to translate from cognition to behaviour.^{17,18}

There was no impact of the form of intervention on adherence levels in general but the effect of form of intervention was seen on the dimension of adherence to self-monitoring. In case of self-monitoring the groups that received intervention through direct interaction were found to have higher levels of adherence compared to their counterparts who received intervention through audio visual form. Self-monitoring demands sustenance in behavior. Unless the message about the significance of self-monitoring is strong in content, form and frequency, it is difficult to persevere after initiating the same.

Efforts at fighting hypertension should be a team work. The finding that audiovisual medium is effective in enhancing cognitive base provides an insight that the same can be extended to social media. While Health Psychologists prepare effective cognitive modules nursing professionals can routinely disseminate the knowledge using social media and ensure adherence through regular feedback.

4.2. Impact on management of hypertension

The results broadly indicated an effective blood pressure management reflected in Blood Pressure values in the intervention groups compared to the Control Group. The results found significant control over the blood pressure levels in all the intervention groups except the one which had repeated exposure to audio visual form of cognitive intervention. Though this group was found to have a lower level of blood pressure compared to the pre-intervention readings, the readings were more comparable to the Control Group.

Audio visual intervention is the one where the target group is a passive recipient of information. Repeated exposure to the contents that includes explanations of serious consequences of uncontrolled hypertension gives rise to fear and anxiety. There are a number of studies relating heightened levels of blood pressure to state anxiety.^{19,20} The other reason could be the resultant desensitization by repetition of information and denial as a consequence of repeated exposure. The study by Van't Riet and Ruiter²¹ supports this finding that repeated exposure to health promoting information may result in disregard, denial, or dismissal of the very information. Such reactions may lead to a casual attitude towards the core message

thereby rendering the intervention futile. In fact, there are reports that while majority of interventions culminate in benefitting the target group, in about 6% of studies it was counterproductive by worsening the conditions²²

Positive feedback on effective management of hypertension goes a long way in sustaining the same. Since nursing staff are the people who take the Blood Pressure reading, they, along with the training from Health Psychologists can provide positive reinforcement to those where the hypertension is effectively managed and counsel those where the management needs better coping.

5. Conclusion

It was found that the combination of direct interaction form and repeated exposure significantly brought down the B.P readings suggesting an effective hypertension management. The reasons for this could be that the very physical presence of the physician on two occasions might have had a reassuring effect on the participants. Research studies proved the positive impact of the physician's presence on prognosis.^{23–25} The findings clearly indicated a positive impact of knowledge intervention on the patients with hypertension. It enhanced the cognitive base related to hypertension, improved adherence and blood pressure levels in post intervention phase.

Repercussions of uncontrolled hypertension are severe and sometimes irreversible. In majority of cases lack of knowledge and complacency are found to be the cause of low or non-adherence. This can be easily handled by knowledge intervention which is cost effective and viable within the clinical set up. In countries where the doctor patient ratio is high when compared to WHO norm, knowledge intervention can constitute an integral part of treatment regimen initiated by Health Psychologists and trained Nurses.

What is already known?

- Knowledge intervention can improve hypertension compliance and management

What does this study add?

- The Knowledge intervention is most effective when it was given by a medical professional at least twice.
- Repeated exposure of recorded knowledge intervention may be counter effective.

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Declaration of competing interest

The Authors declare that there is no conflict of interest.

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Research Paper

Child's Understanding of the Mother: A Quantitative Index

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ABSTRACT

Over the years, the parental role or the process of parenting has transformed reflective in the way parents view and understand their children. Conversely, the way children understand their parents is also very crucial in exalting the rights of children and empowering their agency. An instrument was specially constructed to compare children's understanding of their mothers with factual information provided by their mother. The research instrument accounted for six aspects of their mother's life viz. personal information, health knowledge, likes and dislikes, emotion related, and achievements and aspirations. Data was collected from 162 pairs of mothers and children and was analyzed using descriptive statistics and regression analysis. It was inferred that children's understanding of their mothers was high only on obvious aspects related to them compared to other aspects. The quantitative index provided an insight into the present-day mother child bonding along with its implication for the future geriatric population.

Keywords: *Mother-Child Bond, Family Relationships, Similarity Index, Quantitative Analysis*

Around the turn of the 21st century, the relationship Indian parents share with their children has undergone substantial changes owing to globalization and industrialization. Though the changes started creeping in from early 1990's they took a drastic turn and became very glaring marking a significant generation gap in 2000's. Over the years, the parental role or the process of parenting has transformed extensively reflective in the way parents view and understand their children. Conversely, the way children understand their parents is also very crucial in exalting the rights of children (Skelton, 2007) and empowering their agency (Monteiro & Hariharan, 2019). Parenting and child socialization practices have garnered widespread public attention wherein the processes have been scrutinized, criticized and discussed thoroughly (Ambert, 2001; Kuczynski, Harach, & Bernardini, 1999; Knafo & Galansky, 2008). This can be particularly said about the maternal bond which provides security and attachment powerful enough even in case of father bereavement (Shapiro, Howell, & Kaplow, 2014) or absence (Freeman,

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2017). The shift from joint to nuclear family systems demands even more concentration upon this dyadic process, where mothers expand in the provider role to raise children (Sear, 2021). There are studies which explored mother's role in the interpersonal relationship with the children, but there are hardly any studies which explored the relationship from the child's perspective. While the mother's perspective is important, it is as significant to examine the role played by the child in relating to mother because relationships sustain on mutuality. Exploring children's understanding of their parents gives them their right to participate and empowers them in influencing their own relationship with their parents (Neale, 2002).

Relationships and bonding do not 'happen' automatically. They need to be worked for by both the parties involved. "Relationships" are explained in terms of "exchanges" existing between people (Aoki, 2003). The nature and course of the parent-child relationship is one of the most crucial factors underlying the growth and development of a healthy child irrespective of various theoretical bearings (Malone, Westen, & Levendosky, 2011; Toth, Rogosch, Manly, & Cicchetti, 2006). Communication patterns are the markers of family identity (Galvin, Braithwaite, & Bylund, 2015). It is through communication that family members manage their everyday lives and construct their collective identity, create a relational culture and an exclusive system of understanding that takes shape as attitude, action, and self-concepts in the participants of the relationship (Wood, 2007). Families, considered the primary agents of socialization for children are the first powerful communication connections for the child. This powerful familial communication contributes significantly to developing emotional intelligence in the child which paves the path for successful social competence (Chan & Koo, 2011).

The parent-child relationship is a significantly powerful relationship in an individual's life. The interaction between parents and children lays the foundation for children to discover and understand other relationships and directly has an effect on the bond parents and children share. This dyadic interaction has a critical influence on children's overall functioning and is also considered as an important element for a child's general development and behavior. This also influences the children's physical growth, early language formation, behavioural patterns, social-emotional development, literacy and academic outcomes (achievement) and the child's personality characteristics (Moretti & Peled, 2004). It has been observed by many parents that from the perspective of the child, the bonding with the mother that happens as a single point attachment from birth gradually expands to the father, the other family members, and peers as the child grows. As a result, the time spent with mother gradually declines. By the onset of adolescence and the avenue of new social roles, there is a precipitous drop in the waking time spent between parents and children (Smart, Sanson, & Toumbourou, 2008). However, the question is about the quality of interaction and relationship. There are certain aspects the child would understand by observing the mother while certain aspects will be known to the child only when the mother shares the information with him/her. For this there should be a match between the willingness to share by the mother and also the interest to know in the child. Does the child invest the effort, energy, and time to observe the mother as keenly as the mother does for the child to have an understanding about the antecedents of her emotions such as happiness, distress, annoyance, frustrations, and regrets or her likes and dislikes? Does the mother volunteer to share certain personal information like academic performance in the past, the nature of job, the pay packet, regrets in life or the crisis encountered with the child?

Rationale of the study

Parent-child relationship is a valuable and important resource for parents and children alike throughout their lives, understanding the complexities of this important family dyad is very crucial. Mother and child emotion communication behaviours have also explained significant variance in child anxiety (Brumario & Kerns, 2012). A lot of review has been conducted to understand the mother child relationship from the narratives of the mother but there has not been enough emphasis in literature to understand the interaction of this dyad from the child's perspective. It is imperative to look at the relationship from a child's point of view because of the mutuality involved. It will also enhance the understanding of the changes in the relationship across time. While the role of the parents and mother in particular has received due emphasis both from scientific explorations as well as sociocultural expectations, there has been a vacuum about the role of child for sustenance of this relationship. The reason for this vacuum is the silence of scientific research in this area. Unless the role of the child in understanding the parent receives focus, re-invoked, nurtured and groomed as a sociocultural practice, it is difficult to find a solution for progressive increase in institutionalization of the elderly because of lack of or inadequacy in children's responsibility, willingness and active participation in the care of the elderly. This is particularly true in an affiliated country like India. The objective of this study is to initiate a scientific exploration into the intensity to which the children understand their mothers from a multidimensional perspective, which plays a crucial role in the sustenance of the relationship and acceptance of playing a reciprocal role to the parents in later life.

METHODOLOGY

Sample

The sample was recruited following snowballing to meet sample size targets. The sample for this study consisted of pairs of children (age-group between 10 to 21 years) and their mothers. The data were collected from 167 mother-child pairs residing in Andhra Pradesh, and Telangana, India. Due to incomplete forms or voluntary exit from the study, the final sample size dropped to 162 mother-child pairs (Total $N=324$). Among the children 69 were boys (42.6%) and 93 were girls (57.4%) with a mean age of 16.16 years ($SD = 3.58$). Among the mothers, mean age found was 40.73 years ($SD = 6.41$). Amongst the 162 children, 76.5 % children had a sibling, 13.6% children had two siblings, 0.6 % had three siblings and 9.3% were single children. Taking the birth order into account, 51.2 % children in the sample were first born while 46.9% children were second born and 1.9% children were third born. It was noted that 29% children had grandparents living with them, 24.1% children had their grandparents visit them frequently while 21% children had their grandparents visit them occasionally. Also, 25.9% children had no grandparents. It was found that 43.2 % children were visiting their native place two-three times a year, 18.5% children were visiting their native place once a year and 19.1% children visited their native place rarely, and 18.5% children stay in their native place. Out of the total sample 38.9% children were engaged in attending classes such as music, swimming, sports and the like outside their school hours. Students who attended these activities once a week and twice a week were 8.6% while 21.6% attended the same more than twice a week. On the other hand, 61.1 % children were not engaged in any such activities.

Instruments (Tool)

For the purpose of this study, a questionnaire titled *Children's understanding about their Mothers* was specifically developed by the authors. The questionnaire was a combination of open-ended questions and close-ended questions. It aimed at gathering subjective

information of a child's understanding of his/her parents. This paper presents the children's understanding of mothers.

In order to confirm the child's responses for each of the questions, a parallel questionnaire was constructed for the mothers to fill in their responses. The responses of the mother were considered the real self-identity of the mother because here the mother who was reporting about the facts, likes/dislikes, emotions and aspirations and frustrations are self-reports and hence considered the reference point of the mother's reality about herself. The forms comprised of 3 sections. The first section sought the demographic details. The second and third section had 37 items. Each of it sought inputs on the child's knowledge of the mother that relates to the aspects normally known to a person sharing a close bond. These 37 items were grouped under six broad dimensions viz. health (e.g. does your mother have any health problems?), factual (e.g. what is your mother's date of birth), likes-dislikes (e.g. her favourite singer), leisure (for e.g. her favourite way to relax), achievement-aspiration (e.g. her aim in life) and emotions (e.g. her greatest frustration).

Tool Development Process

The development of the tool took place in two phases.

- ***Phase 1 Item writing***

We considered two major sources of information for item development. The items were developed based on the available recent literature that highlighted on children's understanding of their parents in various areas of life. The items were also made in consultation with field experts regarding the various aspects of parents' lives that the children may or may not be aware of. The total number of holistically brewed items was 51.

- ***Phase 2 Content Evaluation***

We presented the 51-item form to a panel of 10 experts comprising of researchers and psychologists to assess its content validity. Each expert was asked to read the 51 items under 6 dimensions (health, likes-dislikes, factual, leisure, emotional and achievement-aspiration) and indicate if the items was relevant or not relevant under a particular dimension. The content validity ratio (CVR) was calculated using Lawshe's formula. Finally, 37 items were retained in the final tool.

Procedure

About 200 families residing in gated communities, townships, apartment complexes were approached to participate in the study. They were explained about the study in detail. Those families willing to participate in the study were enlisted, following which the children of these parents were also explained about the study. Mothers and their children willing to participate in the study gave their written informed consent/assent respectively by signing the Informed Consent Form (ICF). The administration of the questionnaire was scheduled at the individual residence of the participants at a mutually convenient time. The children and mothers were requested to fill the questionnaires at the same time without any discussion between them. During the process the investigator was present to provide clarifications to the participants where necessary.

Responses of the participants were manually coded by matching the children's responses with the mothers' responses. Each perfectly matching response of the child with the mothers' response was given a score of 1 (e.g., if the mother mentioned her favourite dish and the child's response to 'mother's favourite dish' perfectly matched that of the mother's response, score of 1 was given. Responses that were incompatible were given a score of

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zero. A partial score was given if there was an overlap in the response of the child and mother (e.g., if the mother mentioned 5 talents and the child's responses match with 3 out of those 5 talents, then a partial score was allotted by computing a fraction 3/5 and a score of 0.6 was given). The scores ranged between zero and one. The average time taken by the children to complete the questionnaire varied between 40 to 60 minutes. The average time taken by parents was 30 minutes.

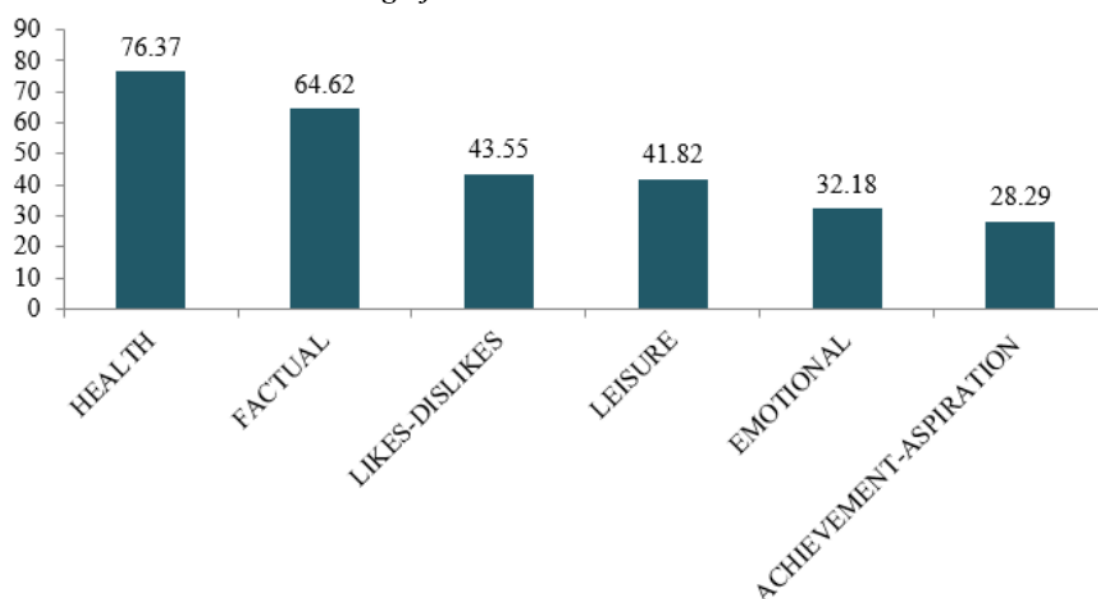
RESULTS

A formula was evolved and applied to derive the dimension wise percentage of understanding of the mothers by the children. For this, the scores of understandings (ranging from zero to one) were summed up for the items under that dimension. The following formula was applied:

$$\frac{\text{Totalscoreofthedimension/Numberofitemsinthedimension}}{\text{Totalnumberofpairs}} \times 100$$

The percentages so arrived are plotted as bar diagrams in figure 1. This computation reflects a quantitative analysis of children's understanding of their mothers in various dimensions of life.

Figure 1. Children's understanding of mothers on various dimensions



The figure is shown in descending order of the categories that can be observed as 'most understood' to 'least understood' areas. It is observed that the children displayed maximum understanding about their mothers on the health dimension (76.37 %), followed by their knowledge on factual dimension (64.62 %) and likes-dislikes dimension (43.55 %). The children had less than 50% knowledge on leisure dimension (41.82 %) and emotional dimension (32.18 %). The children had minimum knowledge regarding their mothers on the achievement-aspiration dimension (28.29 %).

The obtained data were further analyzed in terms of descriptive statistics, Pearson's product-moment correlation coefficient (Pearson's r), and multiple regression analysis using IBM SPSS Statistics 20. The predictors of the study include socio-demographic variables of children such as their visit to native place, admission into classes outside the school, staying

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or not staying with grandparents under the same roof, and having more than one sibling. The criterion variables include the six dimensions of mother's self-identity viz. health, factual, likes-dislikes, emotions, leisure and achievement-aspiration.

Main effects

Using the enter method, regression analyses were conducted to find out the combined contribution of significantly correlated socio-demographic variables of children for each of the dimensions of the mother's self-identity. Prior to this, Pearson's r was computed to find a linear relationship between the predictors and criterions. The predictors which significantly correlated with the criterion were entered into the model. The values of Pearson's r are presented in Table 1. The results of regression analysis are presented from Table 2 to Table 6.

Table 1. Summary of correlations between the demographic variables of the child and dimensions of mother's self-identity for mother child pairs

Predictors	Criterions					
	H	F	LD	L	E	AA
1. Gender						
a. Male	-.066	.036	.156*	-.086	.041	.077
b. Female	.066	-.030	-.156*	.086	-.041	-.077
2. Age						
Group 1 (10-13 years)	-.039	-.047	.007	-.161*	-.101	-.077
Group 2(14-16 years)	.059	-.041	-.039	-.028	-.030	-.031
Group 3(17-18 years)	.014	.023	-.005	.153	.091	-.029
Group 4(19-21 years)	-.028	.064	.033	.056	.051	.127
3. No. of siblings						
One sibling	.080	-.099	.071	-.014	-.012	-.044
Two siblings	.025	.145	.014	.085	-.038	-.074
Three siblings	.066	.055	.166*	.017	.212**	.189*
No siblings	-.165*	-.041	-.120	-.085	.005	.101
4. Birth order of the child						
First born	-.154	-.051	-.052	-.152	-.112	-.013
Second born	.149	.050	.049	.129	.127	.021
Third born	.018	.005	.009	.089	-.054	-.028
5. Presence of grandparents in the house						
Permanent residents	-.033	.039	.055	.048	-.001	-.074
Frequent visitors	.024	.013	-.038	-.154	-.026	.030
Occasional visitors	.077	.085	.114	.088	.003	-.124
Not present	-.060	-.132	-.125	.182*	.024	.162*
6. Times you visited native place						
Two-three times a year	.084	.063	.045	.048	-.033	.084
Once a year	.145	.043	.179*	-.127	.025	-.114
Less than once a year	-.203**	-.150	-.051	-.060	.060	.221**
Staying in native place	-.018	.023	-.167*	.123	-.045	-.203**
Not applicable	-.138	.026	-.86	.017	.004	-.074
7. Any classes regularly attended outside school hours	.157*	.049	.045	-.020	-.060	-.154*
8. How frequently were the classes attended						
Once a week	.063	.073	-.001	.152	.058	.076
Twice a week	.019	-.022	-.002	.023	-.054	-.144
More than twice a week	.131	.024	.055	-.143	-.073	-.137
Not attending any classes	-.157*	-.049	-.045	.020	.060	.154*

Note. $N = 162$. All analyses are two tailed. * $p < .05$, ** $p < .01$. H = Health, F = Factual, LD = Likes-dislikes, L = Leisure, E = Emotion, AA = Achievement-Aspiration

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Pearson's product-moment correlation was run to determine the relationship between all the demographic variables of the child (*gender, age, number of siblings, birth order of the child, presence of grandparents in the house, frequency of visiting native place, any classes regularly attended by the children outside school hours and the frequency of attending these classes*) and the 6 dimensions of mother's self-identity (*health, factual, likes-dislikes, emotional, leisure and achievement-aspiration*) considered under the study for all the mother-child pairs.

From the table 1 following significant correlations were noted: gender and likes-dislikes of mother [$r = .156, n = 162, p < .05$]; age (*10-13 years*) and leisure activities of mother, [$r = -.161, n = 162, p < .05$]; number of siblings (three siblings) and likes-dislikes of the mother, [$r = .166, n = 162, p < .05$]; number of siblings (three siblings) and emotions of the mother, [$r = .212, n = 162, p < .01$]; number of siblings (three siblings) and achievement-aspirations of the mother, [$r = .189, n = 162, p < .05$]; absence of siblings (single child) and health of the mother, [$r = -.165, n = 162, p < .05$]; absence of grandparents and leisure activities of mother ($r = .182, n = 162, p < .05$); absence of grandparents and achievement-aspirations of mother ($r = .162, n = 162, p < .05$); frequency of visiting native place (once a year) and likes-dislikes of mother, ($r = .179, n = 162, p < .05$); frequency of visiting native place (less than once a year) and health of the mother, ($r = -.203, n = 162, p < .01$); frequency of visiting native place (less than once a year) and achievement-aspirations of the mother, ($r = .221, n = 162, p < .01$); frequency of visiting native place (staying in native place) and likes-dislikes of mother, ($r = -.167, n = 162, p < .05$); frequency of visiting native place (staying in native place) and achievement-aspirations of the mother, ($r = -.203, n = 162, p < .01$); any classes regularly attended outside school hours and health of the mother, ($r = .157, n = 162, p < .05$); any classes regularly attended outside school hours and achievement-aspirations of the mother, ($r = -.154, n = 162, p < .05$).

Based on the findings of the above analysis, four multiple regression analyses and one simple regression analysis were run for the children's understanding of their mothers' self-identity. The results of these five separate regression analysis are presented in Table 2 to Table 6.

Table 2. Standard multiple regression analysis showing children's socio-demographic variables predicting of Likes & Dislikes of Mother (N=162)

Predictors	B	SEB	β	T	P
Gender: Boys	0.49	.86	.13	.58	.56
Girls	0.01	.87	.003	.01	.99
Having three siblings	4.18	1.89	.17	2.21	.03
Rare Visits to native place:	-0.62	.39	-.13	-1.61	.11
Staying in native place	-0.83	.39	-.17	-2.13	.03
R^2	0.08				
C	3.01				
F	2.86	$p=0.02$			

Note. Dependent variable: Likes and dislikes of mothers; B = unstandardized beta coefficient, SEB = standardized error of beta, β = standardized beta coefficient, t = t values of beta, p = significance level

Table 2 shows results of regression analysis for socio-demographic variables that were found to have correlation with the likes and dislikes knowledge of the mothers. All the predictors were entered into equation simultaneously. It was observed that all the variables—gender, presence of three siblings, visit to native place (less than once a year, and staying in

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native place) (together as a model) explained significant 8% of variance in understanding of likes and dislikes of mothers, ($R^2 = 0.08$, adjusted $R^2 = 0.06$, $F(5, 156) = 2.86$, $p = 0.02$). Among them, presence of three siblings and staying in native place uniquely predicted their understanding of mothers' likes and dislikes.

Table 3. Standard multiple regression analyses of children's socio-demographic variables predicting of knowledge about Mother's health condition (N=162)

Predictors	B	SEB	β	T	P
Classes attended outside school hours	0.40	0.65	0.14	0.61	0.54
Not having siblings	-0.79	0.38	-0.16	-2.07	0.04
Rare Visit to native place	-0.69	0.28	-0.19	-2.47	0.02
Not attending classes outside school hours:	0.00	0.65	0.00	0.00	1.00
R^2	0.09				
C	3.87				
F	3.69	$P=0.007$			

Note. Dependent variable: Health status of mothers; B = unstandardized beta coefficient, SEB = standardized error of beta, β = standardized beta coefficient, t = t values of beta, p = significance level.

Similarly, standard multiple regression analysis was conducted to find out the combined contribution of significantly correlated socio-demographic variables of children on the knowledge about their mother's health. Table 3 presents the results. It was observed that all the variables—classes attended outside school hours, absence of siblings, rare visits to native place (less than once a year), and not attending any classes outside school hours (together as a model) explained 9% of variance in understanding of mothers' health status, $R^2 = 0.09$, adjusted $R^2 = 0.06$, $F(4, 157) = 3.69$, $p = 0.01$. Among them, absence of siblings and rare visit to native place uniquely predicted their understanding of mothers' health status.

Table 4. Standard multiple regression analyses children's socio-demographic variables predicting Achievements & Aspirations of Mother (N=152)

Predictors	B	SEB	β	T	P
Attending Classes outside school hours	-0.15	0.41	-0.08	-.37	0.72
Having three siblings	1.62	0.89	0.14	1.81	0.07
Absence of grandparents:	0.26	0.17	0.13	1.54	0.13
Rare Visit to native place	0.28	0.19	0.12	1.48	0.14
Staying in native place	-0.43	0.18	-0.19	-2.35	0.02
Not attending classes outside school hours:	0.07	0.40	0.04	0.17	0.87
R^2	0.13				
C	0.82				
F	3.79	$p=0.001$			

Note. Dependent variable: Achievement & Aspiration(s) of mothers; B = unstandardized beta coefficient, SEB = standardized error of beta, β = standardized beta coefficient, t = t values of beta, p = significance level

Again, standard multiple regression analysis was conducted to find out the combined contribution of significantly correlated socio-demographic variables of children, shown in Table 4. It was observed that all the variables—attending classes outside school hours, presence of three siblings, grandparents not being present in the house along with them, rare visits to native place, and not attending any classes outside school hours (together as a model) explained 13% of variance in understanding of achievement-aspirations of mothers, $R^2 = 0.13$, adjusted $R^2 = 0.09$, $F(6, 155) = 3.79$, $p = .001$. Out of all the variables, staying in native place uniquely predicted their understanding of mothers' achievement-aspirations.

Table 5. Standard multiple regression analysis of children's socio-demographic variables predicting understanding of leisure activities of Mother (N=162)

Predictors	B	SEB	β	T	P
Being in the Age group: 10 to 13 years	-0.21	0.14	-0.13	-1.57	.12
Absence of grandparents	0.27	0.14	0.15	1.92	.06
R^2	0.05				
C	0.83				
F	4.01	$p=0.002$			

Note. Dependent variable: Understanding of leisure activities of mothers; B = unstandardized beta coefficient, SEB = standardized error of beta, β = standardized beta coefficient, t = t values of beta, p= significance level

Table 5 shows the standard multiple regression analyses conducted to find out the combined contribution of significantly correlated socio-demographic variables of children on the knowledge about the mother's leisure activities. It was observed that all the variables—children being in the age group of 10 to 13 years and grandparents not being present in the house along with them (together as a model) explained significant (5%) proportion of variance in understanding of mothers' leisure activities, $R^2= 0.05$, adjusted $R^2= 0.04$, $F(2, 159) = 4.01$, $p = 0.02$.

Table 6. Simple linear regression analysis of children's socio-demographic variable predicting understanding of emotions of Mother (N=162)

Predictors	B	SEB	β	t	P
Having Three siblings	6.24	2.27	.21	2.74	.007
R^2	0.05				
C	2.86				
F	7.53	$p=0.007$			

Note. Dependent variable: Understanding of emotions of Mother; B = unstandardized beta coefficient, SEB = standardized error of beta, β = standardized beta coefficient, t = t values of beta, p= significance level

It is revealed from Table 6 that having three siblings explained statistically significant (5%) proportion of the variance in understanding of emotions of mothers, $R^2= 0.05$, adjusted $R^2= 0.04$, $F(1, 160) = 7.53$, $p < .01$. The relationship between these two variables was positive, $\beta = .21$, $p < .01$, having three siblings in the family is associated with increase in understanding of emotions of mothers.

DISCUSSION

The few glaring indicators of the findings are —

- Children's understanding of their mothers are high only on obvious aspects such as health problems and facts such as age, birthday, qualifications etc.
- The least understanding is about the achievements and aspirations of the mother, followed by mother's emotions, leisure and her likes and dislikes

The findings ring an alarm related to family bonding and the withering strength of family as an institution, particularly in affiliation-oriented countries like India. It may be mentioned here that facts about the health and aspects related to qualification, designation and birth dates etc. refer to 'knowing about a person'. This is possible even in the context where two people are in formal relations such as colleagues, lawyer and client, doctor and patient etc. The 'understanding' that strengthens the attachment, bonding in informal and lifelong relationships requires deeper involvement of the persons in partnership. To elaborate, understanding the mother's achievements, aspirations, emotions, leisure and likes and dislikes calls for a quality time together, accurate perceptions preceded by intense

observation with concern for the mother backed by the motivation and interest to draw inferences from the behaviour of the mother, and the desire to reciprocate the love and care to her. The findings clearly indicate that the contemporary Indian society is at the risk of this aspect fading in the children who are busily occupied in pursuit of academic achievement and career building (Whiteman, McHale, Crouter, 2011). This is in fact over-emphasized by the very child rearing process adopted by the parents. The family values shifting from emotional bonding, originating from the cultural roots of affiliation orientation to academic performance, and career building, based on the achievement orientation, perhaps created a mismatch between the cultural ethos and life goals. Such errors in judgements may be at a heavy cost of moving away from the very tradition on which the national character is built. At individual level, this may lead to a state of parental disappointment and frustration with children in later life when the children grow into adults and the parents into senior citizens and expect their children to 'understand' and care for them. What the children had not learned from their childhood cannot be expected from them in later life. In parent-child relationship, when the parents provide all nurturance to their children with expression of love and concern, but the children are not provided an opportunity either for observational learning or the training in the skill to observe in order to perceive and understand intricate details about the parents, (the way parents do for the children) it is unlikely that they learn it by themselves because the parental expectation is focused on academics and achievement.

The results of the regression analyses suggested that the contribution of various demographic factors and visit to native place, children's admission into classes outside the school or grandparents stay or absence under the same roof and having more than one sibling are some of the common factors contributing to the child's understanding of mother. However, in case of the dimensions, the model's contribution ranged between 8% to 13% only. This indicates that there are factors not included in this study design play a major role in children's understanding of their mother. It is necessary to identify these factors and re-introduce them in the family system and child rearing process in order to protect and preserve the cultural roots of the country where parents are considered next to God. The traditional Indian system expects the children to show veneration and take care of them and serve them with commitment and dedication in a process of role reversal once the parents get old (Buch, 2015; Chang & Chang, 2010; Chou, Kröger, & Pu, 2015; Datta, 2017; De Silva, 2017; Hsieh, Huang, Lan, & Ho, 2017; Ramamurti, Liebig, & Jamuna, 2015; Samanta, Chen, & Vanneman, 2015; Watt et al., 2014). The gradual change in child rearing due to the shift from joint family to nuclear family system took the attention away from preparing children in this important aspect. Over-emphasis on academics and career perhaps held the parents as facilitating agents to help children reach this single goal. Thus, in the partnership of parent-child relationship, children were found always in the receiving end and parents confined their roles to that of 'providers' and 'need-satisfiers' with no reciprocal expectations from the children. As a consequence, the children seem to have restricted their roles in fulfilling parental aspirations for them in academic performance and career building, so much so that there are neither expectations from parents nor efforts from the children to understand the parents beyond knowing about the mundane aspects.

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Conflict of Interest

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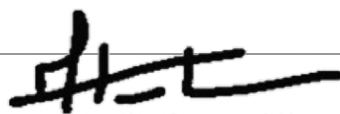
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