5.0 METHODS

5.1 METHODS OF THE STUDY-1

5.1.1 Participants

5.1.1.1 Sample size

A priori computation of sample size with r=-.24 (Raes & Williams, 2010) as input, revealed 133 participants were required for the study at an alpha value of .05 and with an actual power of .80 as completed using G*Power version 3.1.9.2 (Faul et al., 2014).

5.1.1.2 Selection and source of participants

Total 194 participants (from 1- 4th year BSc Nursing) were recruited from Government College of Nursing and NIMHANS College of Nursing in Bangalore. Data collection was done from 16/09/15 to 01/02/16.

5.1.1.3 Inclusion criteria

Who were willing to participate in the study were recruited.

5.1.1.4 Exclusion criteria

Not applicable.

5.1.2 Design

This was a Descriptive Correlation Study.

5.1.3 Variables studied, and instruments

The following variables were studied; mindfulness, resilience, empathy (Affective domain) and perseverative thinking. Data were collected from the students using socio-demographic sheet and Freiburg Mindfulness Inventory (FMI), Connor–Davidson Resilience Scale (CD-RISC), Toronto Empathy Questionnaire (TEQ) and Perseverative Thinking Questionnaire (PTQ).

The socio-demographic sheet included age, gender, education, marital status, and religion as reported by the participants.

Freiburg Mindfulness Inventory (FMI): The FMI is a self-report questionnaire to measure mindfulness. This consists of 14 items and is a very sensitive scale to change. Each item has a 4-point Likert rating from 1 (Rarely) to 4 (Almost always). The total score will be between 14 to 56. A higher score corresponds to high mindfulness. This scale is a valid and reliable instrument to measure mindfulness reported Cronbach's alpha is .86 (Walach, Buchheld, Buttenmüller, Kleinknecht, & Schmidt, 2006).

Connor–Davidson Resilience Scale (CD-RISC): CD-RISC is a brief, self-report questionnaire to measure resilience. Ten items scale was used in this study. Respondents answer each item on a scale from 0 (not true at all) to 4 (true nearly all the time). The range of total score is between 0 to 40. One who scores high has more resilience. This scale has robust psychometric properties (Connor & Davidson, 2003), with Cronbach's alpha=.85 (Campbell-Sills & Stein, 2007). Reported Cronbach's α = .81 among Nigerian nursing students (Aloba, Olabisi, & Aloba, 2016).

Toronto Empathy Questionnaire (TEQ): This is a brief, reliable, and valid instrument to assess the affective components of empathy. TEQ measures empathy primarily as an emotional process. There are 16 items in this scale. Participants will rate each item on a scale from 0 (never) to 4 (always). Individual responses are added to give a total score, with the range of score between 0 to 64. Higher scores indicate a high level of affective empathy. TEQ was validated on college students and has sound psychometric properties (Spreng, McKinnon, Mar, & Levine, 2009).

Perseverative Thinking Questionnaire (PTQ): The PTQ was developed to assess dysfunctional forms of repeated negative thinking (RNT) which are involved in the maintenance of emotional disorders. This consists of 15 items. Participants were asked to answer using the 5-point Likert scale from 0 (never) to 4 (almost always). The PTQ comprises of three core characteristics of RNT (repetitiveness, intrusiveness, and difficulties to disengage) and two associated features (unproductiveness of RNT and RNT capturing mental capacity). Total score may range between 0 to 60, higher the score high level of repeated negative thinking. This scale reported sound psychometric properties (Ehring et al., 2011).

5.1.4 Procedure

Researcher obtained permission from the colleges for data collection. Researcher met each batch of students separately, participants were informed about the voluntary nature of participation in the study and maintenance of the confidentiality. From each batch, students were randomly selected and above mentioned 4 questionnaires and a socio-demographic sheet was given (from the same batch of students who were not part of this study, a different set of questionnaires that was part of study-2 were given).

5.2 METHODS OF THE STUDY-2

5.2.1 Participants

5.2.1.1 Sample size

As per power computation of sample size using G*Power version 3.1.9.2 (Faul et al., 2014) reported 82 participants were required for this research at an alpha value .05, power equal to .80 and with effect size *d* =.3.

5.2.1.2 Selection and source of participants

We recruited 145 students (from 1- 4th year BSc Nursing) were recruited from Government College of Nursing, SDS TRC and RGICD College of Nursing and NIMHANS College of Nursing in Bangalore. Data collection was done from 16/09/15 to 01/02/16.

5.2.1.3 Inclusion criteria

Who were willing to participate in the study were recruited.

5.2.1.4 Exclusion criteria

Not applicable.

5.2.2 Design

This was a Descriptive Correlation Study.

5.2.3 Variables studied, and instruments

In the present study mindfulness, self-compassion, satisfaction with life and spiritual well-being were assessed. Socio-demographic sheet and the following instruments Freiburg Mindfulness Inventory (FMI), Self-Compassion Scale- short form (SCS-SF), Satisfaction with Life Scale (SWLS) and Spiritual Health and Life-Orientation Measure (SHALOM) were used to collect data from the nursing students.

The socio-demographic sheet includes age, gender, education, marital status, and religion as reported by the participants.

Self-Compassion Scale- short form (SCS-SF): This is a self-report questionnaire to measure self-compassion. In this study, we have used 12 items scale. Response for each item will be between 1 (Almost never) to 5 (Almost always). One who scores high has high level of self-compassion. The SCS–SF is a reliable and valid tool to assess self-compassion with reported Cronbach's alpha is ≥.86. This scale has a close correlation with the long form of SCS $r \geq$ .97 all samples (Raes, Pommier, Neff, & Van Gucht, 2011).

Satisfaction with Life Scale (SWLS): This is a short 5-item instrument designed to measure global cognitive judgments of satisfaction with one's life (does not measure either positive or negative affect). The scale usually requires only about one minute to complete the test. Each item response will be scored on a 7-point Likert rating between 1 (Strongly Disagree) to 7 (Strongly Agree). Scores can range from 5 to 35, one who scores high has high level of satisfaction with life. This scale has a good psychometric property and can be widely used among a wide range of age groups with average alpha coefficient.85 (Diener, Emmons, Larsen, & Griffin, 1985). Satisfaction with life scale also focuses on emotional well-being

or underlying psychopathology as it evaluates an individual based on his own criteria (Pavot & Diener, 1993).

Spiritual Health and Life-Orientation Measure (SHALOM): This scale consists of 20 items, with 5 items in each domain of spiritual well-being (SWB). The four domains are personal, communal, environmental, and transcendental. Each item is evaluated for (i) their ideals for spiritual well-being, and (ii) their lived experiences/how they feel. The response for each item will be based on a 5-point Likert rating between 1 (very low) to 5 (very high). Scoring will be based on the manual. SHALOM has a good psychometric property with Cronbach's alpha coefficient for personal-.86, communal-.88, environmental-.87 and transcendental-.95 (Fisher, 2013). The difference of more than 1.0, on a 1 to 5 scale (greater than one standard deviation) between mean values for ideals and lived experiences, in any of the four domains of spiritual well-being, is termed Spiritual Dissonance (Fisher, 2010).

5.2.4 Procedure

Same as above.

5.3 METHODS OF THE STUDY-3

5.3.1 Participants

5.3.1.1 Sample size

A priori computation of sample size using G*Power version 3.1.9.2, revealed 64 participants were required with an effect size d = .347 (Gard et al., 2012) at an alpha value of .05 and with an actual power of .80.

5.3.1.2 Selection and source of participants

After screening, students were randomly allocated into two groups. Yoga group received yoga intervention for 8-week (5 days/week, one hour/day) and the wait-list control (WLC) group continued their routine work for the first 8-week. After the completion of study, yoga intervention was given to control group also. We recruited 100 students (1^{st} and 2^{nd} year General Nursing and Midwifery (GNM) and 1^{st} to 3^{rd} year BSc Nursing) from Kempegowda Institute of Nursing, Bangalore. The research study was carried out between May 2015 to July 2015.

5.3.1.3 Inclusion criteria

- Female students
- Aged between 17-30 years and
- Who were willing to learn yoga were included

5.3.1.4 Exclusion criteria

- Students who were diagnosed with severe neurological or psychiatric illness
- Students receiving treatment for hormonal imbalance
- Participants whoever recently underwent surgical intervention and
- Students who were regularly practicing yoga

5.3.2 Design

The present study was a randomized wait-list controlled (WLC) trial.

5.3.3 Variables studied, and instruments

The following variables were studied- mindfulness, resilience, self-compassion, satisfaction with life, empathy (cognitive domain), perceived stress, low back and hamstring flexibility, peak expiratory flow rate (PFR), handgrip strength, pinch strength, and hand dexterity. Data were collected from the students using socio-demographic sheet and Freiburg Mindfulness Inventory (FMI), Connor–Davidson Resilience Scale (CD-RISC), Self-Compassion Scale-short form (SCS-SF), Satisfaction with Life Scale (SWLS), Jefferson Scales of Empathy Health Professions Student Version (JSE-HPS), Perceived Stress Scale (PSS), Sit and Reach Test, Peak flow Meter (PFR), Jamar Hydraulic Hand Dynamometer, Jamar Hydraulic Pinch Gauge, Purdue Pegboard.

Socio-demographic sheet included name, age, religion, level of education, and address.

Jefferson Scales of Empathy Health Professions Student Version (JSE-HPS): This is a 20-item scale designed to measure empathy (cognitive). Each item should be scored on a 7-point Likert rating between 1 (Strongly Disagree) to 7 (Strongly Agree). The total score will range between 20 to 140. High score corresponds to high level of empathy. This scale has reported robust psychometric properties with Cronbach's alpha .78 and .93 among nursing students of south-eastern part of USA (Fields et al., 2011).

Perceived Stress Scale (PSS): This is a self-reported questionnaire to assess perception of stress in one’s day-to-day life. This is a 10-item questionnaire. Each item should be rated on 5-point Likert scale 0 (Never) to 4 (Very Often). High score represents high level of perceived stress. This scale has reported adequate psychometric properties (Lee, 2012; Cohen, Kamarck, & Mermelstein, 1983).

Sit and Reach Test: Low back and hamstring flexibility were assessed using a sit-and-reach test. The sit-and-reach test is an ideal test to measure hamstring muscle extensibility (López-Miñarro et al., 2009). In this test participant is asked to sit on the floor with legs straight and back straight. Soles of the foot placed flat against the box without bending at knees. Both palms (facing downwards) are placed on the sliding plate (marker) of the measuring line and the participant is asked to slide the plate as far as possible. Movement should be with no jerky movements and legs straight on the floor. The distance is recorded in centimeter.

Peak Expiratory Flow Meter: The Peak expiratory flow rate was measured using peak expiratory flow meter. Participants were asked to take a deep inhalation and then to blow with a blast into the mouthpiece of the flow meter. Readings were recorded in liter. Three readings were recorded, highest reading was noted down.

Jamar Hydraulic Hand Dynamometer: This is widely used instrument to measure hand strength both in healthy and clinical population. The participants were advised to sit comfortably with shoulders relaxed, elbow flexed at 90 degrees. They were instructed to press the handle of the dynamometer using maximum strength. Handgrip strength was measured in kilograms (kg), three readings were recorded with a gap of 20 seconds and mean of all the three readings were calculated. Handle position at 2 is considered as the best position to assess accurate grip strength, similar study reported 35.4 (± 5.2) kg maximum grip strength among women (Trampisch, Franke, Jedamzik, Hinrichs, & Platen, 2012). In our study, handle was placed at 2^{nd} position. This instrument has sound psychometric properties (Abizanda et al., 2012) (Stark, Walker, Phillips, Fejer, & Beck, 2011).

Jamar Hydraulic Pinch Gauge: Is used to measure pinch strength. This has three sub-tests;

1) Key pinch (lateral pinch)- Here student is instructed to squeeze between thumb pad to lateral aspect of middle phalanx of index finger, hold and then release. 2) Palmer pinch

(chuck pinch)- Participant is asked to press thumb pad to pads of the index and middle fingers, hold, and then release. 3) Tip pinch (pulp pinch)- Student is asked to press squeeze between thumb tip to index fingertip, hold, and then release. Each time participants were asked to squeeze with maximum effort. In our study, readings were taken three times and mean value was reported, only right hand was assessed for pinch strength.

Purdue pegboard: The Purdue pegboard test was first developed by Joseph Tiffin, an instrument that is used to measure gross (gross movements of hands, fingers, arms) and fine (fingertip dexterity) motor dexterity, coordination, and neuropsychological assessment (Lafayette instrument, Model 32020, USA). Purdue pegboard has sound psychometric property (Tiffin & Asher, 1948; Causby, Reed, McDonnell, & Hillier, 2014). Indeed, this is an instrument of choice to evaluate fine hand dexterity (Yancosek & Howell, 2009).

In Purdue pegboard, there are four cups at the top of the board equipped with pins, collars, and washers. These are placed from left to right- 25-pins, 20-collars, 40-washers, and 25-pins. Participants were seated comfortably on chair and instrument was placed on the table with stop watch. All students were given trial practice before final readings were recorded. All the instructions were given according to manual. First demonstration followed by instructions and then repetition by participant. If during test pin/washer/ collar drops do not stop to pick it up instead pick new one from the cup. There are four sub-tests, readings were measured accordingly.1) Using right hand, pins from right side cup should be placed from top in right hand row in 30 seconds. 2) Using left hand, pins from left side cup should be placed from top in left hand row in 30 seconds. 3) Using both hands, pins must be picked from respective cups and then place simultaneously in 30 seconds. 4) Assembly- for this test pick up one pin from right hand cup with right hand, place it in top hole of right hand row, meanwhile pick up a washer with left hand and drop it over the pin. Before completing this

right hand must pick collar and drop it on the washer, at the same time right hand should pick washer and drop it over collar. This completes one assembly i.e. pin, washer, collar, washer. Participant will continue this till 60 seconds. Each pin is considered as one point and for one complete assembly it is 4-point, in case of incomplete assembly points will be considered as 1 (only pin), 2 (pin and washer) and 3 (pin, washer, and collar). For example, 6 complete assembly and only pin placed, then 6X4+1=25.

5.3.4 Procedure

Pre-data collection was spread across 6 days, first day informed consent was obtained from the students. Second and third day psychological variables were assessed using self-reported questionnaires. Next two days, sit and reach test, peak expiratory flow rate, handgrip and pinch strength, Purdue pegboard were used to assess physical parameters. Last day, data were collected from the students who could not complete pre-assessment. Meanwhile students were informed about their respective groups. Eight-week yoga intervention was given for yoga group and WLC group carried out their routine activities. After completion of intervention post data was collected for 5 days, first two days' psychological variables and next two days' physical variables were measured. Last day data were collected from student's who did not complete post-assessment.

5.3.5 Yoga Intervention

The yoga intervention is based on Integrated approach to yoga therapy as designed by S-VYASA (Nagarathna, and Nagendra, 2008). Details of yoga intervention are described in the Table 5.3.5.

Table 5.3.5

Yoga Intervention

Sl. No.	Intervention	Approximate time for the practice	Schedule
1	Basic Instructions	15 min.	First day
2	**Breathing practices-** Hands in and out breathing, Hand stretch breathing, Ankle stretch breathing, Leg raising (Alternative and both legs) breathing, Tiger breathing, Rabbit (*Shashanka*) breathing	10 min	Daily-first week to 8th week
3	**Loosening practices-** Twisting, Side bending, Forward and backward bending Jogging	10 min.	Daily-first week to 8th week
4	Sun salutation (*Suryanamaskara*)	10-12 min	Daily-first week to 8th week
5	**Asanas (postures)** **A. Standing posture-** a. Half wheel posture (*Ardhacakrasana*) b. Foot palm posture (*Padahastasana*) c. Half waist rotation posture (*Ardhakaticakrasana*) d. Tree posture (*Vrkshasana*) e. Triangle posture (*Trikonasana*) B. **Sitting posture-** **a.** Diamond posture (*Vajrasana*) **b.** Rabbit posture (*Shashankasana*) **c.** Spinal twist posture (*Vakrasana*/ *Ardhamatsendrasana*) **d.** Camel posture (*Ustrasana*) **e.** Posterior stretch (*Paschimottanasana*) C. **Supine asana** **a.** Fish posture **(***Matsyasana*)	10-15 min	Daily-first week to 8th week

Sl. No.	Intervention	Approximate time for the practice	Schedule
	b. Shoulder stand posture (Sarvangasana) D. **Prone asana** **a.** Cobra posture (*Bhujangasana*) **b.** Grasshopper posture (*Shalabhasana*) **c.** Bow posture (*Dhanurasana*)		
6	Quick Relaxation Technique (QRT)	3min	Daily-first week to 8th week
7	Pranayama- a. Kapalabhati b. Nadishodana pranayama c. Bhramari chanting	8-10 min.	Daily-From 2nd week
8	Yogic games (Krida yoga)	8-10 min	Alternative days
9	Meditation	5 min	Once in a month
10	Lecture session	10 min	Once in a month

5.4 ETHICAL CONSIDERATION

Approval of Institutional Ethics Committee was obtained for this study (RES/IEC-SVYASA/59/2015) and informed consent was obtained from all the students who were recruited for the research study.

5.5 DATA EXTRACTION

Data extraction was done accordingly as mentioned in the manual of each instrument used in the study. Also, we have reported the Cronbach's alpha values of all the questionnaires.

Self-Compassion Scale- short form (SCS-SF): The following items were reverse scored: 1, 4, 8, 9, 11, and 12 (i.e., 1=5, 2=4, 3=3, 4=2, 5=1) and then total mean was computed. One who scores high has high level of self-compassion.

Satisfaction with Life Scale (SWLS): All the item scores were summed to obtain the total score. Scoring can be interpreted as; 30-35 as very high score highly satisfied with life, 25-29 as high score satisfied with life, 20-24 as average of satisfaction with life, 15-19 as slightly below average satisfaction in life, 10-14 as dissatisfied and 5-9 as extremely dissatisfied.

Perceived Stress Scale (PSS): Reverse coding of these items 4, 5, 7, 8 (i.e., 0=4, 1=3, 2=2, 3=1, 4=0) were done and then all items were summed to get the total score. An individual score can range between 0 to 40, scores ranging between 0 to 13 would be considered with low stress, between 13 to 26 as moderate stress and scores above 27 to 40 as high perceived stress.

Toronto Empathy Questionnaire (TEQ): The following items were reverse scored: 2, 4, 7, 10, 11, 12, 14, 15 (i.e., 0=4, 1=3, 2=2, 3=1, 4=0) and then to get the total score all the items score was summed. Higher score represents high level of affective empathy.

Perseverative Thinking Questionnaire (PTQ): All the items were summed to obtain the total score; higher score represents high repeated negative thinking. In addition, the following items were added to obtain the sub-scales scores: Core features of repeated negative thinking (RNT)- 1, 2, 3, 6, 7, 8, 11, 12, 13, Un-productiveness of repeated negative thinking - 4, 9, 14 and Mental capacity captured by repeated negative thinking - 5, 10, 15.

Freiburg Mindfulness Inventory (FMI), Connor–Davidson Resilience Scale (CD-RISC), Spiritual Health and Life-Orientation Measure (SHALOM), and Jefferson Scales of Empathy Health Professions Student Version (JSE-HPS) scoring details we cannot report as permission was limited to our study use only. Data were extracted according to the manual of respective questionnaires.

The Cronbach's alpha Reliability test was run for all the psychological questionnaires used in our study. Here we have reported Cronbach's alpha of all the questionnaires used in the present study; Self-Compassion Scale- short form (SCS-SF) α = .568, Satisfaction with Life Scale (SWLS) α=.709, Freiburg Mindfulness Inventory (FMI) α = .672, Connor–Davidson Resilience Scale (CD-RISC) α = .779, Jefferson Scales of Empathy Health Professions Student Version (JSE-HPS) α = .634, Perseverative Thinking Questionnaire (PTQ) α = .891, Toronto Empathy Questionnaire (TEQ) α = .576.

5.6 DATA ANALYSIS

Data analysis was done using environment R (3.4.0) software. For the survey studies: Pearson's correlation test was applied to know the correlation between variables. Prior to this missing value analysis (i.e., by replacing with missing values in each item by series mean) was done for the data that were missing less than 5%. Then the mean scores of empathy, repetitive negative thinking and mindfulness were subjected to stepwise multiple linear regression analysis to predict resilience in the study 1 and the mean scores of mindfulness, self-compassion, and satisfaction with life were entered as independent variables to explain the variance on spiritual well-being in the study 2. Principal Components Analysis done for Spiritual Health and Life-Orientation Measure (SHALOM) questionnaire and reliability testing (using alpha) was performed for all the questionnaires used in our study. For the experimental study data were analyzed by Repeated measures analysis of variance (RM-ANOVA) followed by post-hoc Bonferroni correction for all psychological and physical variables. We used Listwise deletion for analysis. With the level of significance at $p < 0.05$. For sample size calculation and post hoc statistical power analysis G*Power version 3.1.9.2 was used in all the three studies.