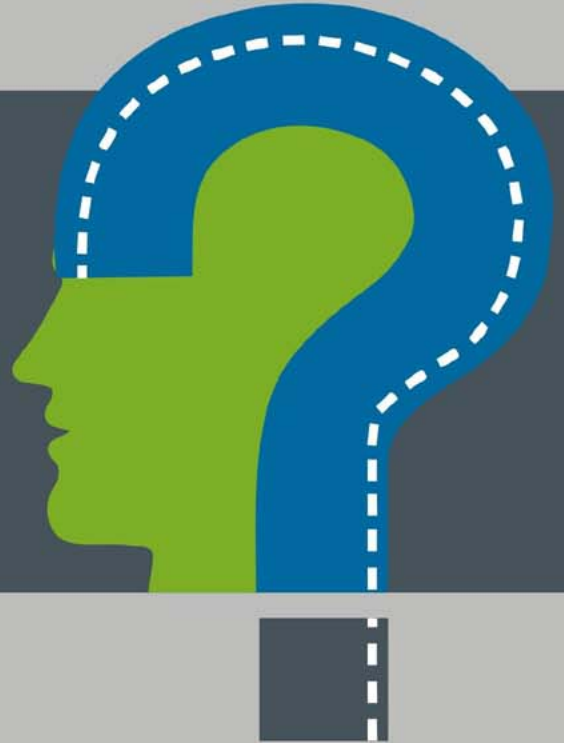


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# PSYCHOLOGY RESEARCH

Volume 8, Number 6, June 2018



*From Knowledge to Wisdom*

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# Psychology Research

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# Comparing Overall Success Rates of Cognitive-Behavioral Therapy, Eye Movement Desensitization and Reprocessing, Dialectical Behavior Therapy and Hypnosis

Edwin K. Yager

University of California at San Diego, La Jolla, CA, USA

This study is a comparative analysis of the effectiveness of four psychotherapeutic treatment modalities: Cognitive-Behavioral Therapy (CBT), Eye Movement Desensitization and Reprocessing (EMDR), Dialectical Behavior Therapy (DBT), and Hypnotic methods (HYP). The aim of this study was to determine the independent effectiveness of the four treatment modalities by reviewing the available literature. A total of 26,724 studies were identified by ProQuest search and screened to eliminate studies that did not permit computation of the success rates of their use. Of that total, 648 studies included objective data in some form, with 207 studies qualifying for inclusion in the analysis. The “Success Rate” measure was used as the standard of measurement, and was obtained by comparing the pre-treatment scores with post-treatment scores as published in the qualifying studies. Analysis revealed the most effective treatment modality to be EMDR, with a success rate of 49.4%. CBT was the second most effective at 40.5%, and the success rates of Hypnosis and DBT were 39.2% and 22.4% respectively. The clinical question in therapy should probably be, “How effective can I expect this method of treatment to be?” The findings of this study reveal CBT to be less effective than EMDR and equally effective as Hypnosis; and with DBT being significantly less effective, we are left with the implication that we must expand what we know.

*Keywords:* CBT, EMDR, DBT, hypnosis, effectiveness, efficacy, success rate

Although subjective opinions abound, objective evidence of the actual effectiveness of common psychotherapies is limited and at times produces contrary findings (Barth et al., 2013). Attempts are commonly made to value the benefit of one psychological treatment modality over another using controlled studies. However, considering the respective efficacy of modalities across studies is not common. For example, a meta-analysis by Gloaguen, Cottraux, Cucherat, and Ivy-Marie (1998) found CBT to be more effective than non-CBT approaches in depression treatment. In contrast, a meta-analysis by Leichsenring (2001) indicated no significant difference in efficacy between CBT and psychodynamic therapy for depression.

Rosenzweig (1936) suggested that all the various forms of psychological treatments are equally effective. He further proposed that it is not the technique which makes a difference, but other factors, including the simple presence of a safe space to discuss worries with a skilled and compassionate provider. Lambert (1992) tried to quantify this thesis and estimated that only 15% of client change occurred due to a specific technique.

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He attributed the rest to motivation or severity of the problem (40%), quality of the therapeutic relationship (30%), and placebo effect (15%). The actual benefit of psychotherapy in the treatment of mental health disorders still remains unclear.

Whereas Barth et al. (2013) compared the efficacy of seven interventions for depression alone; this current study was performed to examine the effectiveness of four treatment modalities of psychotherapy across various mental health problems and diagnoses. The modalities examined included Cognitive-Behavioral Therapy (CBT), Dialectical Behavior Therapy (DBT), Eye Movement Desensitization and Reprocessing (EMDR), and Hypnotic methods (HYP). Without direct comparisons between the effectiveness of psychological treatments across studies and across problem areas, it is difficult to establish the independent merits of each method. Understanding the merit of each treatment modality can further facilitate research into cost-benefit analysis and overall value of the modality.

### **Method**

This study summarizes data contained in published studies of the methods cited in which the efficacy of each method was compared to one or more alternate methods. A significant percentage of all published papers on these methods, including both case and controlled studies, were identified. Following three succeeding filter steps used to identify the qualifying studies, the raw data were used to compute the success rates quoted. No discrimination was made between the types of problems or psychological disorders treated in the studies; the data represent the combined success rates of all problems reported in those studies.

#### **Success Rate**

The measure used in this study was "Success Rate," as opposed to Cohen's  $d$  and/or other effect-size measures, because of the wide variation of the  $n$  for the studies included. This "Success Rate" calculation produced the percentage change in reported mean scores between baseline and post-treatment measurements. Overall success rate for a treatment modality was obtained by averaging the success rates of all studies in which the modality was used. These success rates were then corrected for the wide variation in the  $n$  of the studies.

The analysis is presented without claim of accuracy of the source data provided in the published literature; nevertheless, it reports a substantial portion of existing published studies. Moreover, it constitutes a challenge to the generally held beliefs and expectations regarding the effectiveness of the methods reviewed.

#### **Sources of the Data**

Four prevalent treatment methods were selected for inclusion and comparison: CBT, EMDR, DBT, and Hypnosis. The data were compiled from studies accessed via computer across three widely used electronic databases (*EBSCOHOST's Psychology and Behavioral Sciences Collection*, *Academic Search Premier*, and *Science Direct*). Initial computer search parameters retrieved only clinical trials published in a peer-reviewed journal from the databases. The exception to this search was for Hypnosis, where an additional online database, *Taylor & Francis*, was searched for viable studies; examining only the first 4,000 results of the *Taylor & Francis* database search.

#### **Screening the Data**

The initial computer search across the three databases yielded 26,724 studies in which one or more of this study's treatment methods existed. Employing three screenings successively, the data processor filtered out studies that did not meet the criteria for acceptance as defined in Table 1.

Table 1

*Acceptance Criteria for the Studies*

(a) Studies must be clinical trials published in peer-reviewed academic journals.
(b) Studies must not be literature reviews.
(c) Studies must not be proposed trials.
(d) Studies must not be meta-analyses.
(e) Studies must be published in the English language.
(f) Studies must not use an adjunctive treatment method.
(g) Studies must report treatment time.
(h) Studies must report the number of patients.
(g) Studies must contain sufficient raw data to calculate a success rate.
(h) Studies must not be duplicates from the cross-database search.

**The first (computerized) screen.** The researcher examined 26,724 potential studies for basic criteria compliance, referred to as the first screen. This included inspecting the titles and abstracts of the studies for any violations of criteria (a) through (e), which reduced the number of usable studies to 3,529.

**The second (manual) screen.** All studies passing the first screen proceeded to a visual appraisal of the full contents of the published study, eliminating studies violating any of the criteria numbered (f) through (h), leaving 648 studies.

**The third (manual) screen.** The third and final screen included detailed, visual examinations of the remaining 648 studies, ensuring that each study met criteria (i) through (j). This left 198 studies, or 0.74% of the initial 26,724, which met all criteria for inclusion and therefore were included in this analysis.

Table 2

*Summary of the Three Screenings*

	CBT	EMDR	DBT	HYP
Studies identified in the initial search	11,861	565	1,502	12,796
Studies remaining after the first (computer) screen	1,992	160	36	1,341
Studies remaining after the second (manual) screen	231	62	25	330
Studies remaining after the third (manual) screen	112	29	12	45

**Analysis of Data**

The "Success Rate" measure was used as the standard of measurement and obtained by comparing the pre-treatment scores with post-treatment scores as published in the qualifying studies. Since the  $n$  of the studies varied by a factor of ten or more, correction for this variance was made by multiplying the success rate of each study by the  $n$  of the study, totaling these values and dividing by the total  $n$  of the studies. Please see complete list of studies included in the analysis in the appendixes.

**Results**

The overall results of the analysis are summarized in Table 3. CBT studies, using 4,085 total subjects, resulted in a final success rate of 40.5%. Data from 13 DBT studies, using 217 total subjects, resulted in a final success rate of 22.4%. Data from 29 EMDR studies, using a total of 689 subjects, resulted in a final success rate of 49.4%. Data from 42 HYP studies, using a total of 1,504 subjects, resulted in a final success rate of 39.2%.



The results of the analysis for CBT across problems treated are summarized in Table 4, those for DBT are summarized in Table 5, those for EMDR are summarized in Table 6, and those for HYP are summarized in Table 7.

Table 3

*Overall Average Success Rates Across Treatment Modalities*

	CBT	EMDR	DBT	HYP
Average number of treatments	15.3	6.3	27.2	5.7
Total studies included	112	29	13	40
Total number of subjects	4085	689	217	1479
Success rates	40.5%	49.4%	22.4%	39.8%

Table 4

*CBT Average Success Rates by Problem Category*

Diagnosis	Studies	<i>n</i>	Treatment hours	Success rate
Addiction	3	161	19.0	32.9
Anxiety	97	3,451	15.5	40.5
Depression	5	108	16.8	37.5
Mood	0			
Physical	4	223	18.0	50.7
Sexual	0			
Sleep	4	120	7.9	39.7
Other	0			

Table 5

*DBT Average Success Rates by Problem Category*

Diagnosis	Studies	<i>n</i>	Treatment hours	Success rate
Addiction	1		48	93.3
Anxiety	3		50.7	23.4
Depression	1			23.5
Mood				
Physical	4		20.8	3.2
Sexual				
Sleep				
Other	4		10.8	27.3

Table 6

*EMDR Average Success Rates by Problem Category*

Diagnosis	Studies	<i>n</i>	Treatment hours	Success rate
Addiction				
Anxiety	30		6.3	49.4
Depression				
Mood	1		7.5	57.8
Physical	1		1.5	62.2
Sexual	2		9.0	46.5
Sleep				
Other				

Table 7

*HYP Average Success Rates by Problem Category*

Diagnosis	Studies	n	Treatment hours	Success rate
Addiction				
Anxiety	4		4.3	23.4
Depression	1		16	55.1
Mood	1		13	56.3
Physical	25		5.9	26.1
Sexual	1		9	25.0
Sleep	2		3.5	34.4
Other	8		3.5	46.0

### Discussion

The fact that objective data were found in less than 10% of the 26,724 studies brings into question the validity of frequently made claims of modality effectiveness. Casting further question on the validity of generally expected success rates, only 207 studies (less than 1% of the identified studies) contained objective data in a form that permitted computation of success rates. The unexpected reality of these numbers is considered significant in and of itself because it pinpoints the limitation to validating the methods.

These findings are concerning since even CBT, at a Success Rate of 40.5%, has become widely accepted as the standard of care in the treatment of a wide variety of behavioral health disorders. CBT's conventionally understood, more elevated efficacy as the treatment of choice is undermined when compared to EMDR at 49.4% and HYP at 39.2%.

### Limitations

It is evident that comparing studies using different report measures can be problematic. The current analysis compared success rate (percentage change in scores between pre and post treatment) obtained by studies using different measures to evaluate reported symptoms. These measures include, but are not limited to: the Test Anxiety Inventory (TAI), Child Reaction Index (CRI), Revised Children's Manifest Anxiety Scale (RCMAS), and Beck Depression Inventory (BDI). Different measures use different scales and scoring systems. As such, simply comparing the percentage change between studies is an insufficient statistical analysis. However, the point of this paper is to give an overall impression of the efficacy of various treatment modalities, and the information from these findings is disappointing even though non-conclusive.

It is additionally limiting that within each study chosen for the analysis, several measures were occasionally reported and one might claim that choosing only one measure can lead to a selection bias. The measure chosen in such occasions was the most effective measure within that study.

This study does not intend to make claims dependent on statistical significance, but to shed light on the overall efficacy rates as reported by available studies in the field. A more robust meta-analysis that will compare scores on similar measures using a weighted system could support these findings with more consistent significant statistical results. In addition, it might be appropriate to consider additional treatment modalities if studies support results that show similar or higher success rates than those reported here.

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### Appendix A

#### Spread sheets and authors of the CBT method

##### Sheet 1—CBT raw data

Author	Dx	Tx hrs	N1	M1	Sd1	N2	M2	Sd2	% change	Correction weight for <i>n</i>
ADDIS	PANIC D	13.5	20	5.2	5.10	20	3.9	4.7	25	500.0
ARNTZ	GAD	12	25	57.5	8.30	25	52.7	10.3	8.3	208.7
BARLOW	PANIC D	15	15	5.5	0.90	15	2.6	1.4	52.7	790.9
BARLOW	GAD	15	7	5.4	0.90	7	2.7	1.4	50.0	350.0
BOUCHARD	PANIC D	22.5	14	1.5	1.55	14	0.13	0.2	91.3	1,278.7
BRYANT	ASD	7.5	33	27.1	7.46	33	16.58	12.5	38.9	1,282.5
BUDNEY	CANNABIS	14	30	7.9	4.00	26	5.1	4.7	35.4	1,063.3
BURKE	AGORAPHOBIA	30	12	29.3	7.71	12	15.16	10.5	48.2	578.1
BUTLER	GAD	10.7	19	29.8	12.90	19	12.4	10.7	58.4	1,109.4
CALEAR	ANX		530	8.9	6.41	484	7.86	7.0	11.5	6,087.8
CARLBRING	PANIC D	10	24	52.6	10.80	24	31.3	9.1	40.5	971.9
CHARD	PTSD	35.5	36	65.5	26.39	36	9	11.0	86.3	3,105.0
CHEN	ANX	12	63	54.4	8.90	63	42.7	6.5	21.5	1,355.0
CHOI	PANIC D	24	20	61.4	11.04	20	42.42	8.7	30.9	618.7
CLARK	ANX	5	7	7.4	2.60	7	5	1.8	32.4	227.0
COTTRAUX	OCD	20	30	9.6	1.70	30	1.9	2.1	80.2	2,406.3
CRASKE	AGORAPHOBIA	24	34	5.9	4.80	34	1.19	2.1	79.9	2,715.4
CRASKE	PANIC D	11	24	5.9	0.80	24	2.4	1.7	59.3	1,423.7
CRASKE	PANIC D	22	20	19.0	12.00	20	0.9	1.5	95.3	1,905.3
DANNON	PANIC D	16	23	21.4	10.00	23	9.9	8.0	53.7	1,236.0
DAVIDSON	SOCIAL PHOBIA	14	60	39.2	10.40	48	20.6	9.9	47.4	2,846.9
DeBEURS	PANIC D	12	18	7.5	1.18	18	5.83	1.9	22.0	395.2
DeBEURS	PANIC D	0	18	6.2	1.18	18	4.35	1.7	29.5	531.0
DeRUITER	PANIC D	8	13	3.0	0.70	13	2.8	0.8	6.7	86.7
DUGAS	GAD	28	25	6.4	1.19	25	3.4	1.8	46.5	1,163.5
DURHAM	GAD	18	14	1.8	0.70	14	0.8	0.8	55.6	777.8
DURHAM	GAD	18	15	6.2	0.70	15	3	1.4	51.6	774.2
EHLERS	PTSD	9.8	20	27.5	9.70	14	5	5.2	81.8	1,636.4
FAIRBURN	PTSD	8	25	70.9	16.20	25	37.5	30.4	47.1	1,177.7
FAIRBURN	EATING D	16.67	65	3.6	1.01	58	1.57	1.3	56.3	3,657.4
FECYEAU	PTSD	14.5	23	29.5	9.94	23	11.7	7.3	60.3	1,387.2
FOA	PTSD	13.5	14	24.5	6.62	14	11.07	4.0	54.8	766.9
FREESTON	OCD	40.5	15	25.1	5.00	15	12.2	9.6	51.4	770.9
FROMMBERGER	PTSD	12	10	70.5	7.20	10	34.8	15.0	50.6	506.4

GELERNTER	SOCIAL PHOBIA	24	17	17.9	8.10	17	12.1	8.7	32.4	550.8
GERSONS	PTSD	16	22	21.1	7.30	22	13.4	5.6	36.5	802.8
GRAZIANO	DEP		41	17.2	8.60	36	15.23	8.5	11.2	461.1
GREEN	MENOPAUSAL	20	4	39.8	12.40	4	16.9	9.5	57.5	230.2
GREIST	OCD	11	66	25.2	4.30	66	17.6	6.2	30.2	1,990.5
GRUBER	SOCIAL PHOBIA	30	5	52.7	8.00	5	40.7	11.8	22.8	113.9
GRUNES	OCD	12	14	12.3	3.02	14	11.4	2.7	7.3	102.4
HEDMAN	PANIC D		570	10.5	4.90	404	5.3	4.8	49.5	28,228.6
HERBERT	SAD	12	14	128.3	37.39	14	74.8	38.0	41.7	583.5
HOPE	SOCIAL PHOBIA	27	13	19.4	7.40	13	18.5	12.0	4.6	60.3
HSIEH	ANX	12	9	11.9	3.33	9	8.75	3.5	26.4	237.7
JARNEFELT	INSOMNIA	8	32	22.4	16.30	30	20.4	14.5	8.9	285.7
KAYROUZ	ANX		11	11.7	6.35	10	3.8	2.2	67.5	743.0
KENDALL	ANX	16	54	48.8	20.13	54	36.93	22.0	24.3	1,311.0
KENWRIGHT	OCD	1.27	22	26.5	5.10	22	20.2	9.2	23.8	523.0
KOBAK	OCD	12	28	22.8	3.68	28	16.32	7.0	28.5	797.5
KOH	PANIC D	4.67	21	26.4	6.60	21	8.9	4.0	66.3	1,392.0
KUBANY	PTSD	14.5	46	72.9	18.40	45	15.8	14.4	78.3	3,603.0
LADOUCEUR	GAD	15.8	14	6.4	0.74	14	2.64	1.6	58.5	818.9
LANZA	SUBSTANCE D	24	19	31.2	17.40	19	18	13.6	42.3	803.8
LEE	PTSD	10.5	12	20.6	10.00	12	13.25	12.0	35.6	427.4
LIDDLE	SUBSTANCE D		112	28.5	17.36	112	19.75	18.2	30.6	3,430.4
LILLIECREUTZ	PHOBIA	2	30	52.8	6.52	30	45	6.3	14.8	443.2
LINDEN	GAD	21.6	36	26.8	8.30	36	17.3	10.5	35.4	1,276.1
LOERCH	PANIC D	7.5	14	25.4	7.89	14	9.14	6.3	64.0	895.4
MARKS	PTSD	10	18	3.2	0.80	18	1.6	1.2	50.0	900.0
MARKS	PANIC D	6	29	7.3	1.00	29	3.6	1.3	50.7	1,469.9
MCDONAGH	PTSD	24.5	29	69.9	16.80	29	53.1	28.8	24.0	697.0
McEVOY	DEP	20	38	26.9	8.90	38	16.5	11.3	38.7	1,469.1
MCLEAN	OCD	30	31	21.9	5.80	31	16.1	6.7	26.5	821.0
McMURCHIE	DEP		33	21.1	5.47	33	12.88	8.9	38.9	1,284.6
MERSCH	SOCIAL PHOBIA	16	20	5.2	1.12	20	2.87	1.3	44.3	885.4
NEUNER	PTSD	6	17	25.2	7.40	15	19.1	11.7	24.2	411.5
NEWMAN	SOCIAL PHOBIA	16	16	42.9	12.40	16	36.2	9.5	15.6	249.9
NEWMAN	PANIC D	12	18	2.4	0.90	18	1.44	0.4	39.7	715.5
O'CONNOR	OCD	20	15	25.5	7.10	15	13.3	8.6	47.8	717.6
OST	GAD	12	18	23.9	6.45	18	11.39	5.9	52.4	943.6
OST	PANIC D	15.19	26	5.2		26	2.04		60.7	1,578.0
OST	PANIC D	12	15	49.9	15.53	15	30.2	20.8	39.4	591.6
OTTO	SOCIAL PHOBIA	30	20	4.9	0.80	15	3.5	1.3	28.6	571.4
PARKER	DEP	10	11	16.1	5.60	11	10.6	7.4	34.2	375.8
PAUNOVIC	PTSD	27	8	95.1	25.70	8	49	24.2	48.5	387.8
PAXLING	GAD		44	68.7	5.94	44	57.82	13.0	15.9	699.0
PETRY	GAMBLING	8	70	8.7	3.90	70	2.9	3.6	66.7	4,666.7
RESICK	PTSD	12	62	74.8	18.77	62	39.08	31.1	47.7	2,959.0
ROSS	PANIC D	18	15	6.1	8.33	15	0.13	0.4	97.9	1,467.9
RUSSELL	OCD	14.4	23	24.8	3.70	23	17.8	8.4	28.2	649.2
RYBARCZYK	INSOMNIA	16	46	49.8	38.60	46	22	17.8	55.8	2,567.9
SALABERRIA	SOCIAL PHOBIA	20	18	23.2	2.92	18	16.9	5.8	27.2	488.8

SANNIBALE	PTSD	18	33	13.4	7.36	33	7.47	5.2	44.3	1,461.7
SATO	INSOMNIA	4.25	20	2.3	0.60	20	1.2	0.4	47.8	956.5
SCHEERS	FATIGUE	16	84	48.4	7.10	84	29.3	14.0	39.5	3,314.9
SCHNEIDER	PANIC D		43	7.0	1.20	33	4.7	2.0	32.9	1,412.9
SCHOLING	SOCIAL PHOBIA	16	30	26.9	6.40	30	16.1	7.9	40.1	1,204.5
SCHOLING	SOCIAL PHOBIA	8	15	24.0	7.50	15	12.5	6.9	47.9	718.8
SERFATY	EMOTIONAL	8	19	46.3	21.60	19	26	21.0	43.8	833.0
SHARP	PANIC D	12	30	21.3	4.10	30	7.1	7.5	66.7	2,000.0
SHEAR	PANIC D	15	24	4.0	4.10	20	1.2	3.2	70.0	1,680.0
SPENCE	ANX	10	22	6.0	1.02	22	2	2.3	66.7	1,466.7
STANGIER	SOCIAL PHOBIA	15	2	80.9	12.00	2	59.7	20.3	26.2	52.4
STANLEY	GAD	21	31	5.1	0.26	31	1.83	1.9	64.2	1,989.8
STANLEY	GAD	15	29	60.1	9.47	29	51.6	10.2	14.1	410.1
STANLEY	GAD	8	6	5.5	0.58	5	3.8	0.5	30.9	185.5
STEKETEE	HOARDING D	12	23	63.4	14.95	23	53.73	18.5	15.3	351.4
TARRIER	PTSD	16	33	77.8	14.95	33	50.82	24.0	34.6	1,143.3
TAYLOR	SOCIAL PHOBIA	28	32	174.8	18.00	32	154.2	23.6	11.8	377.1
TELCH	PANIC D	18	34	4.2	9.47	34	0.18	1.3	95.7	3,253.6
TROEUNG	DEP	16	11	10.1	3.73	11	7.64	2.8	24.3	267.1
TURNER	SOCIAL PHOBIA	30	21	122.3		21	93.7		23.4	491.1
VAN BALKOM	OCD	12	25	28.0	7.00	19	12.5	9.3	55.4	1,383.9
VAN OPPEN	OCD	12	28	28.7	5.30	28	13.4	9.4	53.3	1,492.7
VOGEL	OCD	24	16	24.9	2.90	16	16.7	7.2	32.9	526.9
WALLER	BULIMIA	19.2	70	4.5	6.51	70	1.84	5.1	58.7	4,105.6
WETHERELL	GAD	12	18	4.9	0.80	18	2.4	1.6	51.0	918.4
WHITTAL	OCD	12	41	23.5	4.30	30	10.6	7.1	54.9	2,250.6
YANG	SLEEP D	3.5	22	48.0	11.79	22	27.18	7.6	43.4	954.3
YOSHINAGA	SAD	21	15	91.8	23.50	15	51.7	27.8	43.7	655.2
		15.3	4,085				Corrected success rate average: 40.5%			165,541.3

### Sheet 2—Studies included

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## Appendix B

### Spread sheets and authors of the EMDR method

#### Sheet 1—EMDR raw data

Author	Dx	Tx hrs	N1	M1	SD1	N2	M2	SD2	% change	
ADRUIZ	PTSD	5.0	124	7.2		124	2.2		69.6	8,628.3
BALCOM	SHAME	7.5	9	45.6		9	19.2		57.8	520.2
BLOOMGARDEN	EATING D	1.5	43	6.1	3.1	43	2.3	5.3	62.2	2,676.0
CHEMTOB	PTSD	4.0	32	36.5	11.6	32	16.5	13.0	54.9	1,757.6
EDMOND	SEXUAL	6.0	6	16.3	7.2	6	8.6	6.7	47.2	283.4
ENRIGHT	ANXIETY	2.0	35	65.5	8.4	35	51.8	15.4	21.0	734.7
FESKE	PANIC D	5.0	15	45.3	25.1	15	27.1	26.4	40.2	602.6
GOLDSTEIN	ANX	6.0	18	8.8	3.0	18	6.7	3.5	24.1	434.2
GRAINGER	PTSD	2.0	29	7.7	1.6	29	1.9	2.1	74.9	2,171.2
GREENWALD	PTSD	3.0	15	6.2	1.6	15	2.2	2.3	64.5	967.0
HEBER	PTSD	4.0	1	47.0		1	23.0		51.1	51.1
HEIDE	PTSD	11.0	5	12.8	1.8	5	10.8	4.7	15.6	78.1
INOUE	PTSD	20.0	1	25.0		1	21.0		16.0	16.0
IRONSON	PTSD	6.0	10	26.6	11.6	10	9.1	11.2	65.8	657.6
JABERGHADERI	SEXUAL	12.0	7	34.9	5.8	7	18.9	7.9	45.8	320.9
JONGH	PHOBIA	2.0	1	10.0		1	0.0		100.0	100.0
KONUUK	PTSD	8.0	41	34.3	8.0	41	5.4	4.8	84.3	3,457.9
LEE	PTSD	4.6	12	16.8	7.8	12	8.2	5.7	51.0	611.8
MARCUS	PTSD	5.8	62	17.9	16.5	42	12.3	14.6	31.2	1,932.7
MAXWELL	ANX	6.0	1	32.0		1	6.0		81.3	81.3
MURIS	PHOBIA	2.0	9	10.3	1.5	9	8.8	2.9	15.0	135.0

NAZARI	OCD	8.0	30	24.8	5.4	30	13.6	5.5	45.2	1,356.8
NIJDAM	PTSD	6.5	70	7.8	39.4	70	6.3	19.9	19.2	1,346.2
ORAS	PTSD	2.5	13	61.8	11.9	13	33.5	19.4	45.8	595.3
POWER	PTSD	10.0	27	35.1	4.4	27	24.0	8.7	31.6	853.8
ROOS	PTSD	4.0	26	30.5	11.5	26	17.7	9.6	42.0	1,091.1
ROTHBAUM	PTSD	9.0	20	26.0	7.1	20	10.7	11.5	58.8	1,175.3
TAYLOR	PTSD	8.0	15	26.4	10.0	15	16.4	9.1	37.9	568.2
WADAA	PTSD	12.0	12	38.9	7.0	12	12.3	6.2	68.4	820.6
		6.3	689				Corrected success rate average: 49.4%			34,025.4

### Sheet 2—EMDR studies included

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### Appendix C

#### Spread sheets and authors of the DBT method

##### Sheet 1—DBT raw data

Author	Dx	Tx hrs	N1	M1	SD1	N2	M2	SD2	% change	
CHEN	BINGE-EATING	23.0	8	2.38	3.16	8	1.29	1.6	45.8	366.4
COURBASSON	SUBSTANCE D	48.0	14	22.4	18.2	8	1.5	3	93.3	1,306.3
FELIU-SOLER	BPD	20.0	18	4.72	1.88	18	4.61	2.03	2.3	41.9
HILL	BINGE-EATING D	12.0	18	3.61	1.16	18	2.48	1.39	31.3	563.4
KEUTHEN	TRICHOTILLOMANIA	15.0	10	18.5	-	10	7	-	62.2	621.6
KLEIN	BINGE-EATING D	40.0	5	4.7	3.11	5	3.75	1.5	20.2	101.1
LYNCH	ANOREXIA NERVOSA	8.0	34	14.69	1.49	34	18.26	2.18	-24.3	-826.3
MEANEY-TAVARES	DEP AND ANX	16.0	17	31.94	12.18	17	19.06	11.13	40.3	685.5
NEE ( STUDY 1)	BPD	4.0	1	21.07	-	1	8.68	-	58.8	58.8
NEE ( STUDY 2)	BPD	4.0	1	19.46	-	1	0.54	-	97.2	97.2
RITSHCEL	DEP AND ANX	70.0	55	32.47	12.78	42	26.34	15.08	18.9	1,038.3
STIEL	PTSD	66.0	29	2.13	0.4	25	1.66	0.69	22.1	639.9
WASSER	DEPRESSION		7	2.43	1.56	7	1.86	1.62	23.5	164.2
		27.2	217				Corrected success rate average: 39.2%			4,858.4

##### Sheet 2—DBT studies included

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## Appendix D

### Spread sheets and authors of the HYP method

#### Sheet 1—HYP raw data

Author	Dx	Tx hrs	N1	M1	SD1	N2	M2	SD2	% change	
ABRAMOWITZ	INSOMNIA	4.0	17	35.9	2.3	17	27.5	1.8	23.4	397.8
ANBAR	EATING D	7.0	1	7		1	2		71.4	71.4
ALLADIN	DEPRESSION	16.0	82	39		82	17.5		55.1	4,520.5
ASKAY	PAIN	1.0	27	67.8	22.2	27	55.6	28.9	18.0	485.8
BARKLEY	SMOKING	7.0	8	16.6		8	8.1		51.2	409.6
BOLOCOFSKY	WEIGHT	9.0	57	70.2		57	66.2		5.7	324.8
BOUTIN	TEST ANXIETY	8.0	1	17		1	5		70.6	70.6
CARMODY	SMOKING	2.0	145	100		145	0.45	5.7	99.6	14,434.8
DEIKER	COMPULSION	4.0	1	19		1	1		94.7	94.7
DICKSON- sp	CESSATION	1.0	116	100		107	0.67		99.3	11,522.7
ELKINS	PAIN	5.0	13	91.31		13	25.38		72.2	938.7
ELKINS	PAIN	2.7	21	100		21	19		81.0	1,701.0
ELKINS	LIBEDO	9.0	1	8		1	6		25.0	25.0
ENEAS	PAIN	1.0	15	15	3.74	15	6.13	3.13	59.1	887.0
GALOVSKI	IBS	12.0	11	13.55	8.77	11	10	7.62	26.2	288.2
GALOVSKI	IBS	6.0	1	68		1	52		23.5	23.5
GAY	HYPERTENSIO N	8.0	15	88.7	7.3	15	80	5.3	9.8	147.1
GRONDAHL	CHRONIC PAIN	10.0	12	51.5		12	41.6		19.2	230.7

HAWKINS	NAUSEA	1.0	10	12.3	3.3	10	8.3	1.5	32.5	325.2
HAWKINS	SLEEP D	3.0	6	3.5		6	1.2		65.7	394.3
HORTON-HAUS	ARTHRITUS	10.0	26	62.5		26	27.5		56.0	1,456.0
JENSEN	PAIN	10.0	8	3.21	1.76	8	1.32	1.28	58.9	471.0
JENSEN	PAIN	10.0	26	4.64	1.95	26	3.78	2.35	18.5	481.9
JENSEN	CANCER PAIN	4.0	5	5.13	0.77	5	4	0.47	22.0	110.1
JENSEN	PAIN	10.0	23	5.99	1.833	23	5.09	1.92	15.0	345.6
JOHNSON	LEARN DISABIL	3.0	15	14.8	4.9	15	15.53	5.11	-4.9	-74.0
LINDFORS	IBS	12.0	83	27.5	7.2	83	24.6	7.8	10.5	875.3
LIOSI	PAIN	2.0	10	4		10	2		50.0	500.0
LOWEN	IBS	7.0	13	45.9	19.6	13	31.5	18.2	31.4	407.8
LU	SMOKING	3.0	25	7.8	1.5	25	3	2.6	61.5	1,538.5
MELNICK	TEST ANXIETY	3.0	9	181.67	22.23	9	148.6	17.12	18.2	164.0
MUTKE	READING COM	5.0	94	65		94	78		-20.0	-1,880.0
PATTERSON	PAIN	1.0	10	1.33	0.4	10	1.29	0.49	3.0	30.1
PATTERSON	PAIN	1.0	11	48.33	26.23	11	38.33	28.63	20.7	227.6
RASKIN	HYPERTENSI ON	4.0	8	151.3	16.7	8	146.9	22.7	2.9	23.3
RIEGEL	SMOKING	4.0	29	100		29	37.9		62.1	1,800.9
TAN	PAIN	4.0	9	25.22	3.83	9	16.78	7.29	33.5	301.2
UNTAS	ANXIETY	1.0	29	8.17	3.6	29	6.59	3.8	19.3	560.8
WALTERS	DISTRESS	13.0	1	16		1	7		56.3	56.3
WERNER	CHILDBIRTH	3.0	485	60.5	19.9	485	42.9	23.5	29.1	14,109.1
		5.7	1,479						Corrected success rate average: 39.8%	59,013.3

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# Role of Self-Regulation and Self-Care With Academic Performance

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Life demands compete with academic study for all levels of education. Higher education now includes strong representation of multiple generations as well as strong representation of both campus-based and online students. Research indicates that students at various stages and in different formats of academic study present some different needs as well as different strategies for managing these needs concurrently with academic study. Research has supported the use of self-care behaviors in reduction of stress, with some studies indicating also an association of self-care and academic performance. In addition, research has also indicated role of student-driven factors such as self-regulation in academic performance. Much of self-care behaviors such as physical activity, consumption of fruits and vegetables, and sleep habits include self-regulation. This study examined association of self-care behaviors in physical activity, consumption of fruits and vegetables, and sleep from selected items of the Personal Wellness Questionnaire and Plan and self-regulation from selected scales of the Motivated Strategies for Learning Questionnaire (MSLQ) of Organization, Resource Management, Effort regulation, and Help-Seeking. Results will assist educators in promotion of student self-care and self-regulation behaviors that can facilitate successful academic endeavor. Answers will also provide guidance to educators and institutions on priority of effort in students support for self-care and self-regulation.

*Keywords:* academic self-regulation, student self-care, student wellness, student success

Academic study can produce the challenge and stress for life that is much like the challenge and stress produced with work demands in a person's life. Students in elementary through graduate school are often told that school is a form of work for them, much as the paid work of a "job". Whether a person is working in academic study or on a job, life still demands care of the self in physical, mental, and social well-being. There has been research support for mutual benefit from self-regulation in self-care for health factors with concurrent self-regulation of academic study.

## Review of Literature

Beccaria, Rogers, Burton, and Beccaria (2016) noted the common experience of university students with stress and strain during their academic study. Beccaria, et al., also noted the benefits of coping strategies of self-care to help juggle management of these demands. Their study focused specifically on strategies of health-promoting behaviors. These authors examined both distance and on-campus university students and found no significant difference between needs for self-care nor efficacy of health-promoting behaviors as

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positive coping strategies with stressful impact of academic study. These authors noted that literature provides mixed results on academic performance between campus-based and online students. They also indicated mixture of both internal and external influences on capacity to cope with life distractors to study. These authors found no evidence of influence on health-care-promoting behaviors and grade point average (GPA). Wald (2011) examined the association of three health-promoting behaviors of physical activity, fruit and vegetable intake, and sleep to academic performance. She found that these three behaviors provided significant but weak positive association with grade point average.

Hollingsworth (2010) examined the relationship between dimensions of wellness and academic performance of elementary students through comparison of scores on the Five Factor Wellness Inventory for Elementary Children and current annual state testing of academic content mastery. The results of this study indicated significant correlation between test score in Reading, Language, and Math with social, physical, and coping composites of wellness.

Griggs and Crawford (2017) conducted examination of multiple health-related factors and academic performance of college freshman. These factors included factors of health-hindering behavior such as sexual risk-taking, alcohol use, or drug use as well as factors of health promotion such as hope and emotional well-being. Core Self-Evaluation (CSE) was also examined with a core component of this as locus of control. Their findings indicated that both hope and CSE had important impact on academic performance.

Vermunt (2005) discussed several student factors that impact on the way that students learn and study, three of which relate to student-self-regulation—motivation, work habits, and study skills. Motivation was further described to include meaning-directed, reproduction-directed, or application-directed learning, with meaning-directed learning the only approach with a positive correlation. Vermunt used an Inventory of Learning Styles that included both self-regulation and external regulation learning processes. Self-regulation activities included “planning learning activities, monitoring progress, diagnosing problems, testing one’s results, adjusting and reflecting” (p. 213). External regulation learning activities included students yielding to external sources such as “introductions, learning objectives, directions, questions, or assignments from a teacher or textbook author” (p. 213). This inventory also examined a scale on Lack of Regulation, which examined how the student monitored difficulties with regulation of individual learning process. Results of the study indicated some positive relationship between self-regulations strategies and academic and exam performance, but predominately negative associations with external regulations.

Jacobson and Harris (2008) specifically investigated self-regulation of learning with nontraditional students and also the framework of distance learning. They described the tendency of research to indicate student dependence on external motivation and lack of systemic approach to studying. In their study, Jacobson and Harris used the Motivated Strategies for Learning Questionnaire (MSLQ) which included scales relevant to self-regulation—organization, self-regulation, time, study environment, and help-seeking. They provided a definition of self-regulated learning as “a dimensional construct that contained the three aspects of cognition, individual motivation, and goal-directed behavior” (p. 414). Self-regulated learner behavior included planning, organizing, self-instruction, self-monitoring, and self-evaluation at various points within the learning process.

Jacobson and Harris (2008) also noted sequences of processes in self-regulation that included “self-evaluation, seeking information, goal setting and planning, record keeping and self-monitoring, environmental structuring, self-consequences, persistence, rehearsing, and memorization” (p. 414). Examples

were given such as self-monitoring, setting goals, and adapting learning strategies. A key point was that the student be an active and engaged participant in the learning process.

There seem to be differences in self-regulated learning between non-traditional and traditional students. Jacobson and Harris (2008) indicated that non-traditional students tend to learn strategy from life experiences. The study done by Jacobson and Harris showed results of non-traditional students scoring higher in areas of Organization, Critical Thinking, Metacognitive Self-regulation, and Effort Regulation.

Edelbring and Wahlstrom (2016) indicated that self-regulated learning centers around the three factors of motivation, autonomy, and the student's control of his or her own learning process. They also emphasized the importance of the ability of a student to self-regulate in today's demand for a student to be able to learn anywhere at any time as online learning and mobile application study increase.

Hailikari and Parpala (2014) noted that higher education has for a long time had concerns about study progress of students—the time that it takes for degree completion. They noted that personal situations such as health or financial issues could slow study time. They also noted that institutional factors could bear influence such as student guidance or course availability and sequence. A key finding was that organized study had strong positive correlation with factors such as self-initiative, diligence, and enthusiasm about study.

### **Health-Promotion Strategies of Promise**

Beccaria, et al. (2016) found that health-promoting behaviors did act as a buffer between student stress and strain with both campus-based and online student participants. They also found that a pathway of health-promoting behaviors was equally predictive of outcomes with campus-based and online students. Suggested strategies to offer by institutions were both pro-active and early intervention strategies that could be offered to either campus-based or online students. One example was a web-based promotion of student well-being that could easily be embedded into course curriculums. Another example was to focus messages on coping, health, and wellbeing of the student versus messages on possible university-desired outcomes such as improved GPAs or student retention.

Often, educators at all levels, speak belief that academic performance is enhanced through effective levels of personal wellness across a person's physical, mental, and even social health. The relationship between dimensions of wellness and academic performance of elementary students through comparison of scores on the Five Factor Wellness Inventory for Elementary Children and current annual state testing of academic content mastery was examined by Hollingsworth (2010). The results of this study indicated significant correlation between test score in Reading, Language, and Math with social, physical, and coping composites of wellness.

The specific items of assessment of wellness in the study indicated that social wellness involved friendship and love such as experienced with family and peers. Physical wellness included exercise and nutrition. Wellness in coping focused on how well a person challenges and stress in everyday life and had capacity to move beyond these.

Griggs and Crawford (2017) conducted examination of multiple health-related factors and academic performance of college freshman. These factors included factors of health-hindering behavior such as sexual risk-taking, alcohol use, or drug use as well as factors of health promotion such as hope and emotional well-being. CSE was also examined with a core component of this as locus of control. Their findings indicated that both hope and CSE had important impact on academic performance.

### **Demands of Academic Study**

Beccaria, et al. (2016) noted that literature provides mixed results on academic performance between campus-based and online students. They also indicated mixture of both internal and external influences on capacity to cope with life distractors to study. Mishra (2018) studied the various stressors experienced by students training to be teachers. Those founds in this study seem to be common among undergraduate students. Examples are concern over course grades, monetary concerns, concerns over getting a job when they graduate, and then anxiety after graduation on perhaps delay in getting that job. Mishra also noted that student backgrounds prior to college could influence level of stress, such as a greater adjustment needed with students from a rural background.

Cestari, Riberiro, Florencio, Mendes de Paula Pessoa, Magalhaes, and Barbosa (2017) noted the co-occurring physical distress that can be present with academic stress. In the experience of academic stress as with other life stressors, the physical symptoms can suggest depression or digestive system imbalance. This study found that women especially could also experience increased production of the hormones, cortisol, and adrenaline which could promote emotional exhaustion, anxiety, depression, or even panic.

### **Self-Regulation**

The health care professions such as medical doctor and nursing are tasked with leading the general populace in self-care of health. Some research has examined the degree to which these professionals regulate their self-care in the academic preparation for their professional practice. Potgieter (2015) noted that these professionals could support and encourage self-care by members of their public they served to the degree that they effectively cared for self. Potgieter found that these professionals in preparation experienced the same challenges in self-care within adjustment to academic study as other students do. Study results indicated need for integration into the core curriculum study on self-care such as the role of physical activity, healthy diets, stress management, time management, and even financial management. This study also indicated the benefits of wellness promotion programs by institutions for students, faculty, and staff.

Self-regulation is innately related to the locus of control with an individual. Marr and Wilcox (2015) described Health Locus of Control as “how much individuals believe they are in control of their current and future health” (p. 122). Internal locus of control is represented with individuals who believe that they have the control over their health outcomes, while external locus of control is represented with individuals who believe that their health outcomes are beyond their personal control and due to factors outside their management. Marr and Wilcox noted that high internal locus of control was predictive of better health outcomes such as less practice of negative health habits and greater practice of positive health habits such as healthier dietary habits.

### **Conceptual Framework**

Several conceptual frameworks are integrated with this study. Beccaria, et al. (2016) used a framework from occupations stress by Osipow and Spokane (1984) in which there was integration of the three domains of stress, strain, and coping. Stress and strain were mediated by coping. As Beccaria, et al., noted, academic study is work for the student in much the same way that a job with an employer is work.

Self-care models included a framework of health-promoting behavior by Beccaria, et al. (2016) and Marr and Wilcox (2015). Beccaria, et al., examined the health-promoting behaviors of “nutrition, physical activity, stress management, spiritual growth, interpersonal relationships, and health responsibility” (p. 27). These authors

measured frequency of engagement in these behaviors and found that habit formation of health promoting behaviors countered negative impact of academic stress for campus-based and online students. Beccarria, et al., noted the benefit of institutional promotion of health promoting behaviors through pro-activity in providing encouragement and means for these. Marr and Wilcox (2015) recommended inclusion of assessment of health locus of control with students and then integration of promotional venues with self-efficacy and increased social support to encourage students who might have greater external locus of control.

Both of these models had common messages for institutions and faculty in promotion of student self-care to enhance academic efficacy as well as more optimal whole student wellness. Both models found that health self-care provided positive support for academic efficacy. Both models noted the need for and benefit of institutional promotion of and support of student engagement in health self-care. Finally, both models noted a need for the institutional message of self-care as a core of the academic experience—a message that is consistently communicated in multiple venues of university life.

### **Purpose of the Study**

This study examined association of self-care behaviors in physical activity, consumption of fruits and vegetables, and sleep from selected items of the Personal Wellness Questionnaire and Plan (Hollingsworth, 2015) and self-regulation from selected scales of the MSLQ (Taylor, 2012) of Organization, Resource Management, Effort regulation, and Help-Seeking. The following hypotheses were presented.

H1<sub>a</sub>: There is a positive correlation between student engagement in the self-care behaviors of physical activity, consumption of fruits and vegetables, and sleep and Grade Point Average (GPA).

H1<sub>b</sub>: There is a positive correlation between student self-regulation in Organization, Resource Management, Effort regulation, and Help-Seeking and Grade Point Average (GPA).

H1<sub>c</sub>: There is a positive correlation between student engagement in the self-care behaviors of physical activity, consumption of fruits and vegetables, and sleep and student self-regulation in Organization, Resource Management, Effort regulation, and Help-Seeking.

### **Method of Study**

A survey was administered to 301 students in both campus and online courses at UWA, undergraduate and graduate to examine association of self-care behaviors in physical activity, consumption of fruits and vegetables, and sleep from selected items of the Personal Wellness Questionnaire and Plan (Hollingsworth, 2015) and self-regulation from selected scales of the MSLQ (Taylor, 2012) of Organization, Resource Management, Effort regulation, and Help-Seeking. Twenty-one percent of respondents were undergraduate and 79 percent of respondents were graduate students. Twelve percent of respondents were in campus based programs and 88 percent were in a totally online program. The survey included self-report questions for both letter grade and Grade Point Average (GPA) to support confidentiality of participants. This survey was administered through Qualtrics and was anonymous with participants providing no personal identification. A word copy of the survey is attached as Appendix A.

### **Results of Study**

Study results were analyzed using Qualtrics and trends identified for high and low adherence to national recommendations on the three modalities of self-care as evidenced through physical exercise, consumption of

fruits and vegetables, and sleep time. Trends were also identified in the 12 factors of academic self-regulation. Respondents self-reported letter grade averages of 95 percent as either an A or a B and self-reported GPAs. Respondents self-reported letter grade averages of 95 percent as either an A or a B and 91 percent as GPA above 3.0, the numerical assignment for a letter grade of a B. The discrepancy in percentages between letter grade and GPA is probably explained by use of self-report versus mining of actual transcript data. Table 1 summarizes factors in self-care activity.

Table 1

*Summary of Factors on Self-Care Activity*

Factor	Highest Adherence	Lowest Adherence
I do physical exercise at least 20 to 30 minutes a day	At least 2 days a week—48%	Hardly ever—21%
I eat fruits and vegetables, fresh or cooked other than fried	At least 5 servings a day—7%	Hardly every other than fries—4%
My daily average hours of sleep now is	7-8 hours a night—45%	4 or less hours a night—4%

Results revealed that the population sampled engaged in the self-care habit of physical exercise per the recommended days per week from the Center for Disease Control (2018) and sleeping the recommended number of sleep hours for adults from the most recent published information from the National Sleep Foundation (2015) at above 45 percent affirmative response. Only seven percent of respondents indicated daily consumption of fruits and vegetables as recommended by the U.S. Food and Drug Administration (2018).

Table 2

*Summary of Factors on Academic Self-Regulation*

Factor	Strongly Agree	Strongly Disagree
<b>Organization</b>		
When I study for my courses, I outline the material to help me organize my thoughts.	33%	4%
When I study for a course, I go through readings and class notes to find the most important ideas.	59%	< 1%
I make simple charts, diagrams, or tables to help me organize course material.	14%	18%
<b>Resource Management</b>		
I usually study in a place where I can concentrate on my course work.	60%	< 1%
I make good use of my study time for courses.	39%	1%
I find it easy to stick to a study schedule.	17%	10%
I have a regular place set aside for studying.	38%	6%
I make sure I keep up with weekly assignments for courses.	76%	0%
I schedule my life activities to give me sufficient time to study.	34%	3%
<b>Effort Regulation</b>		
I work hard to do well in courses even if I don't like what we are doing.	79%	0%
Even when course materials are dull and uninteresting, I manage to keep working until I finish.	72%	< 1%
Even if I feel lazy or bored when studying for classes, I stick with it until I finish what I planned to do.	61%	< 1%

Responses indicated the strongest (over half affirmative responses) self-regulatory habits to be exploration of reading and class notes to discern most important ideas; studying in locations to facilitate concentration; keeping up with weekly assignments; working hard in a course even if student does not like the content, finds content dull and uninteresting, or feels lazy or bored when studying for classes. Effort regulation was most strongly reported of the three areas of academic self-regulation.

Cross-tabulations were also run on data collected as shown in Table 3. Interestingly, participants indicated the greatest adherence to national recommendations for physical exercise, but when cross-tabulation was run, this did not show strong alignment with academic self-regulation factors. Participants showed the lowest overall adherence to national recommendations for consumption of fruits and vegetables, yet cross-tabulations showed the strongest alignment of this with academic self-regulation factors.

Table 3  
*Cross-Tabulations of Data*

Self-Regulation Factor	Physical Exercise at least 4 times a week	Daily Consumption of Fruits and Vegetables	Sleep at least 7 hours daily
When I study for my courses, I outline the material to help me organize my thoughts.	6%	22%	17%
When I study for a course, I go through readings and class notes to find the most important ideas.	14%	40%	29%
I make simple charts, diagrams, or tables to help me organize course material.	4%	10%	7%
I usually study in a place where I can concentrate on my course work.	12%	36%	30%
I make good use of my study time for courses.	9%	26%	22%
I find it easy to stick to a study schedule.	5%	13%	12%
I have a regular place set aside for studying.	9%	23%	18%
I make sure I keep up with weekly assignments for courses.	17%	49%	38%
I schedule my life activities to give me sufficient time to study.	7%	21%	17%
I work hard to do well in courses even if I don't like what we are doing.	16%	49%	35%
Even when course materials are dull and uninteresting, I manage to keep working until I finish.	17%	46%	32%
Even if I feel lazy or bored when studying for classes, I stick with it until I finish what I planned to do.	13%	39%	29%

### Conclusion

A strong majority of respondents reported letter grade averages and GPAs over 90 percent. The majority of respondents were engaged in graduate study and online study, both of which require more employment of internal locus of control for both self-care and academic study. In re-examination of the hypotheses, the study revealed the followings.

H1<sub>a</sub>: There is a positive correlation between student engagement in the self-care behaviors of physical activity, consumption of fruits and vegetables, and sleep and Grade Point Average (GPA). Engagement in national recommendations for physical activity and hours of sleep was reported by over 40 percent of participants. Less than 10 percent of participants reported adherence to the national recommendation for consumption of fruits and vegetables. This could be supported by several life factors such as ease of access to foods other than fruits and vegetables, lack of ease of eating fruits and vegetables “on the go”, or expense of eating healthier.

H1<sub>b</sub>: There is a positive correlation between student self-regulation in Organization, Resource Management, Effort regulation, and Help-Seeking and Grade Point Average (GPA). Effort regulation was reported as the strongest component with participants. All three areas had responses in most items of over 30 percent. Two items showed less than 20 percent—student creation of charts, diagrams, or tables to organize study and ease of adherence to a planned study schedule. The results indicate that participants in this study engage in strong academic self-regulation and this is paired with grades in the A and B grade ranges.



H1<sub>c</sub>: There is a positive correlation between student engagement in the self-care behaviors of physical activity, consumption of fruits and vegetables, and sleep and student self-regulation in Organization, Resource Management, Effort regulation, and Help-Seeking. Cross-tabulation of results showed the greatest alignment between self-care management and academic self-regulation to be in the consumption of national recommendations of fruits and vegetables. Much weaker alignment was shown between level of physical activity or sleep and academic self-regulation. This suggests the greater effort needed to consume the recommended daily dosage of fruits and vegetables which may be aligned with greater exertion of effort in academic self regulation.

This study was conducted with students at one university and results do not offer the generalizability that could be discerned from further study with other institutions and geographic locations. More detailed assessment of a greater number of factors in both self-care and academic self-regulation would provide additional information on correlation of these two areas. This study examined general trends versus intra-participant results. Conduct of intra-participant study in these areas could be used to guide students with improvement of efficacy in both self-care and academic self-regulation.

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### Appendix A: Survey

These are questions about some of your habits while a student. Please first answer the general demographic questions and then answer each question with the response that best fits you.

#### Demographic Questions

- A. Classification
1. Freshman
  2. Sophomore
  3. Junior
  4. Senior
  5. Graduate Student—Masters
  6. Graduate Student—Educational Specialist
- B. Type of program
1. Campus
  2. Online
- C. Age range
1. 25 or younger
  2. 26-35
  3. 36-45
  4. 46 or older
- D. Type in what culture or ethnicity you identify with
- E. Type in what gender you identify with

#### Survey Questions

1. I do physical exercise at least 20 to 30 minutes a day.
  - a. 7 days a week
  - b. 4-5 days a week
  - c. 2-3 days a week
  - d. At least once a week
  - e. A few times a month
  - f. Hardly ever
2. I eat fruits and vegetables, fresh or cooked other than fried.
  - a. At least five servings a day
  - b. One or two servings a day
  - c. A few times a week

- d. Hardly every other than fries
3. My daily average hours of sleep now is
    - a. 7-8 hours a night
    - b. 5-6 hours a night
    - c. 4 or less hours a night
  4. When I study for my courses, I outline the material to help me organize my thoughts.
    - a. Strongly agree
    - b. Somewhat agree
    - c. Neither agree nor disagree
    - d. Somewhat disagree
    - e. Strongly disagree
  5. When I study for a course, I go through readings and class notes to find the most important ideas.
    - a. Strongly agree
    - b. Somewhat agree
    - c. Neither agree nor disagree
    - d. Somewhat disagree
    - e. Strongly disagree
  6. I make simple charts, diagrams, or tables to help me organize course material.
    - a. Strongly agree
    - b. Somewhat agree
    - c. Neither agree nor disagree
    - d. Somewhat disagree
    - e. Strongly disagree
  7. I usually study in a place where I can concentrate on my course work.
    - a. Strongly agree
    - b. Somewhat agree
    - c. Neither agree nor disagree
    - d. Somewhat disagree
    - e. Strongly disagree
  8. I make good use of my study time for courses.
    - a. Strongly agree
    - b. Somewhat agree
    - c. Neither agree nor disagree
    - d. Somewhat disagree
    - e. Strongly disagree
  9. I find it easy to stick to a study schedule.
    - a. Strongly agree
    - b. Somewhat agree
    - c. Neither agree nor disagree
    - d. Somewhat disagree
    - e. Strongly disagree

10. I have a regular place set aside for studying.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
11. I make sure I keep up with weekly assignments for courses.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
12. I schedule my life activities to give me sufficient time to study.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
13. I work hard to do well in courses even if I don't like what we are doing.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
14. Even when course materials are dull and uninteresting, I manage to keep working until I finish.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
15. Even if I feel lazy or bored when studying for classes, I stick with it until I finish what I planned to do.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree nor disagree
  - d. Somewhat disagree
  - e. Strongly disagree
16. What is your letter grade average in your courses at this time?
  - a. I have an A average
  - b. I have a B average
  - c. I have a C average
  - d. I have a D average

e. I have an F average

17. What is your numerical Grade Point Average (GPA) in your courses at this time?

a. 4.00

b. 3.00-3.99

c. 2.00-2.99

d. 1.00-1.99

e. Less than 1.00

# A Survey Towards Holistic Management of Schizophrenia

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Holistic management of schizophrenia involves main stream pharmacological intervention, complimentary medicine intervention, therapeutic intervention, and other psychosocial factors, such as accommodation, education, job training, employment, relationship, friendship, exercise, overall well-being, smoking, substance abuse, suicide prevention, stigmatisation, recreation, entertainment, violent behaviour, arrangement of public trusteeship and guardianship, day-day-living skill, integration with community, management of overweight due to medications, and other health complications related to medications amongst others. Our review shows that there is no integrated survey by combining all these factors. We are conducting an international web based survey to evaluate the significance of all these factors and present them in a unified manner. We believe this investigation will contribute positively towards holistic management of schizophrenia. There will be two surveys. In the pharmacological intervention survey, five popular drugs for schizophrenia will be chosen and their efficacy as well as harmful side effects will be evaluated in a scale of 0-10. This survey will be done by psychiatrists. In the second survey, each element of therapeutic intervention and psychosocial factors will be evaluated according to their significance in a scale of 0-10. This survey will be done by care givers, psychologists, case managers, and case workers. For the first survey, we will contact the professional bodies of the psychiatrists in English speaking countries and request them to ask their members to participate in the survey. For the second survey, we will contact the professional bodies of clinical psychologist and care givers in English speaking countries and request them to ask their members to participate in the survey. Additionally for both the surveys, we will contact the relevant professionals through personal contact networks. For both the surveys, mean, mode, median, standard deviation, and net promoter score will be calculated for each factor and presented then in a statistically significant manner. Subsequently, each factor will be ranked according to their statistical significance. Additionally, country specific variation will be highlighted to identify the variation pattern. The results of these surveys will identify the relative significance of each type of pharmacological intervention, each type of therapeutic intervention, and each type of psychosocial factor. The determination of this relative importance will definitely contribute to the improvement in quality of life for individuals with schizophrenia.

*Keywords:* schizophrenia, holistic management, individualized treatment, antipsychotics, survey

## Background

Schizophrenia is a brain disorder that impacts how a person acts, thinks, and perceives the world (Coyle, 2017). It is characterized by symptoms, such as delusions, hallucinations, disorganised speech, and diminished

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emotional expression (Shenton et al., 1992). The cause of these symptoms has been attributed to a dysregulation of dopaminergic signalling (American Psychiatric Association, 2013). Schizophrenia is considered amongst the topmost 10 common disorders in the world (Mathers & Loncar, 2006), as about one percentage of the general population suffers from schizophrenia (Simeone, Ward, Rotella, Collins, & Windisch, 2015). Schizophrenia generally appears in the late teens or early adulthood. However, it may also appear in middle ages (Kirkbride, Fearon, & Morgan, 2006). Generally, the early onset of schizophrenia is associated with severe positive and negative symptoms (Galletly et al., 2016). Schizophrenia was found to be more severe and more common in men than in women (Aleman, Kahn, & Selten, 2003; McGrath, Saha, Chant, & Welham, 2008). Schizophrenia is a chronic disorder that can be managed effectively with due care and management principles, in addition to antipsychotic medications. However, the likelihood of recovery is the highest, when schizophrenia is diagnosed and treated at its onset (Galletly et al., 2016). With medications and non-pharmacological therapy, many individuals with schizophrenia can live independently and have a satisfactory life, as we explain in the current study.

The long-term disability burden related to schizophrenia is far greater than any other mental disorders (Neil, Carr, & Mihalopoulos, 2014). The direct cost of schizophrenia amounts to one-three percentage of national health care budget and is almost up to 20 percentage of the direct expenses of all types of mental health costs in most of the developed nations (Galletly et al., 2016). The indirect costs, such as independent accommodation, financial support, supported employment, and training, are comparable or even more than the direct costs, such as medications and hospital fees.

Importantly, one aim for treating this disorder is not only decreasing some of the symptoms, but also enhancing the quality of life of the patients (by having successful jobs, relationships among others). There are various quantitative studies on managing different symptoms associated with schizophrenia, such as a meta-analysis of population-based studies of premorbid intelligence and schizophrenia (Khandakera, Barnetta, Whitec, & Jonesa, 2011), a quantitative magnetic resonance imaging study (Wible et al., 2001), and Royal Australian and New Zealand College of Psychiatrists clinical practice guidelines for the management of schizophrenia and related disorders (Galletly et al., 2016). However, there is no study till today that has combined all the factors associated with the holistic management of schizophrenia, which we address in this study.

### **Possible Causes of Schizophrenia**

Here, we will first discuss the possible causes of schizophrenia symptoms and how knowing them can lead to a successful holistic management of the disorder. There is no single cause of schizophrenia though several factors have been identified (Park, Lee, Furnham, Jeon, & Ko, 2017). As mentioned above, the probability of developing schizophrenia was found to be larger in males than females (Aleman et al., 2003; McGrath et al., 2008). It was also reported that the onset of schizophrenia occurs earlier in males than females (Cornblatt, Lenzenweger, Dworkin, & Erlenmeyer-Kimling, 1985). Several studies have shown that schizophrenia may be hereditary (Matsumoto, Walton, Yamada, Kondo, Marek, & Tajinda, 2017). It has been found that if one of the parents suffers from schizophrenia, the children have a 10 percentage chance of having that condition. Individuals with schizophrenia may become sensitive to any family tension, which may cause relapse (Buchanan, 2007). Stressful events might precede the onset of schizophrenia, as these incidents may act as triggering events in at-risk individuals (Nasrallah & Hwang, 2009). Before any acute symptom of schizophrenia may become

evident, individuals with schizophrenia may become anxious, irritable, and unable to concentrate. These symptoms cause difficulties with work and relationships may deteriorate.

Alcohol and drug use, particularly cannabis and amphetamine, might initiate psychosis in people susceptible to schizophrenia (Pogue-Geile & Harrow, 1984; Li, Lu, Xiao, Li, He, & Mei, 2014; Medhus, Rognli, Gossop, Holm, Mørland, & Bramness, 2015). Substance abuse is strongly linked to the recurrence of schizophrenia symptoms (Moore, Mancuso, & Slade, 2012). Individuals with schizophrenia use alcohol and other drugs more than the general population (Chiappelli, Chen, Hackman, & Elliot Hong, 2017; Regier et al., 1990), which is detrimental to their treatment. A large number of individuals with schizophrenia have been found to smoke which contributes to poor physical health and well-being (Olfson, Gerhard, & Huang, 2015). Methamphetamine, cannabis, and cocaine are found to trigger psychotic states in individuals with schizophrenia (Moustafa et al., 2017). Many studies have shown that methamphetamine can induce psychosis and schizophrenia, as reported in Thailand (Kittirattanapaiboon, Mahatnirunkul, Boonchareon, Thummawong, Dumrongchai, & Chutha, 2010) and Finland (Niemi-Pynttäre, Sund, Putkonen, Vormaa, Wahlbeck, & Pirkola, 2013). Substance abuse is much higher in individuals with schizophrenia than in the general population (Sara et al., 2015). In one research study (Barkus & Murray, 2010), it was found that the use of cannabis and amphetamines significantly contributes to the risk of psychosis. Individuals with schizophrenia are generally sensitive to the psychotogenic effects of stimulant drugs, which act by releasing dopamine (M. -V. Seeman & P. Seeman, 2014). As the symptoms of schizophrenia encompass almost all aspects of life, a holistic paradigm involving all the factors in management of daily living is very important.

### **Methods of Review**

In our study, the eligibility criteria for selection of studies are their effectiveness in addressing issues related to holistic management of schizophrenia. The studies we considered are those which help manage symptoms of schizophrenia. Our search strategy included the following key words: schizophrenia, treatments, therapy, antipsychotic medication, management, quality of life, accommodation, employment, and holistic. Many of these searches were conducted in combination. For example, we searched experimental studies that include all of these key words: schizophrenia, social relationship, and therapy (or treatment). We examined articles carefully to make sure the goal of the study is addressing the treatment of some symptoms of schizophrenia. Studies that did not address this topic were excluded. We repeated the same search using other aspects of schizophrenia, as we show in Table 1. Throughout this review, we provide assessment of the validity of the findings. We also provide interpretations of the results. We have studied only major antipsychotic medications. We have searched studies in Pubmed, PsychInfo, and in Google Scholar. A decision tree for our method of articles selection is given in Figure 1. Out of 296 articles initially identified for the proposed review, 113 were removed for duplication. Again out of 183 studies, 19 articles were excluded for non-relevant design criteria, 15 articles were excluded for participant criteria, 15 articles were excluded for mode of intervention, 10 articles were excluded for psychosocial reasons, and five articles were excluded for other reason. Finally 119 studies were included for review.



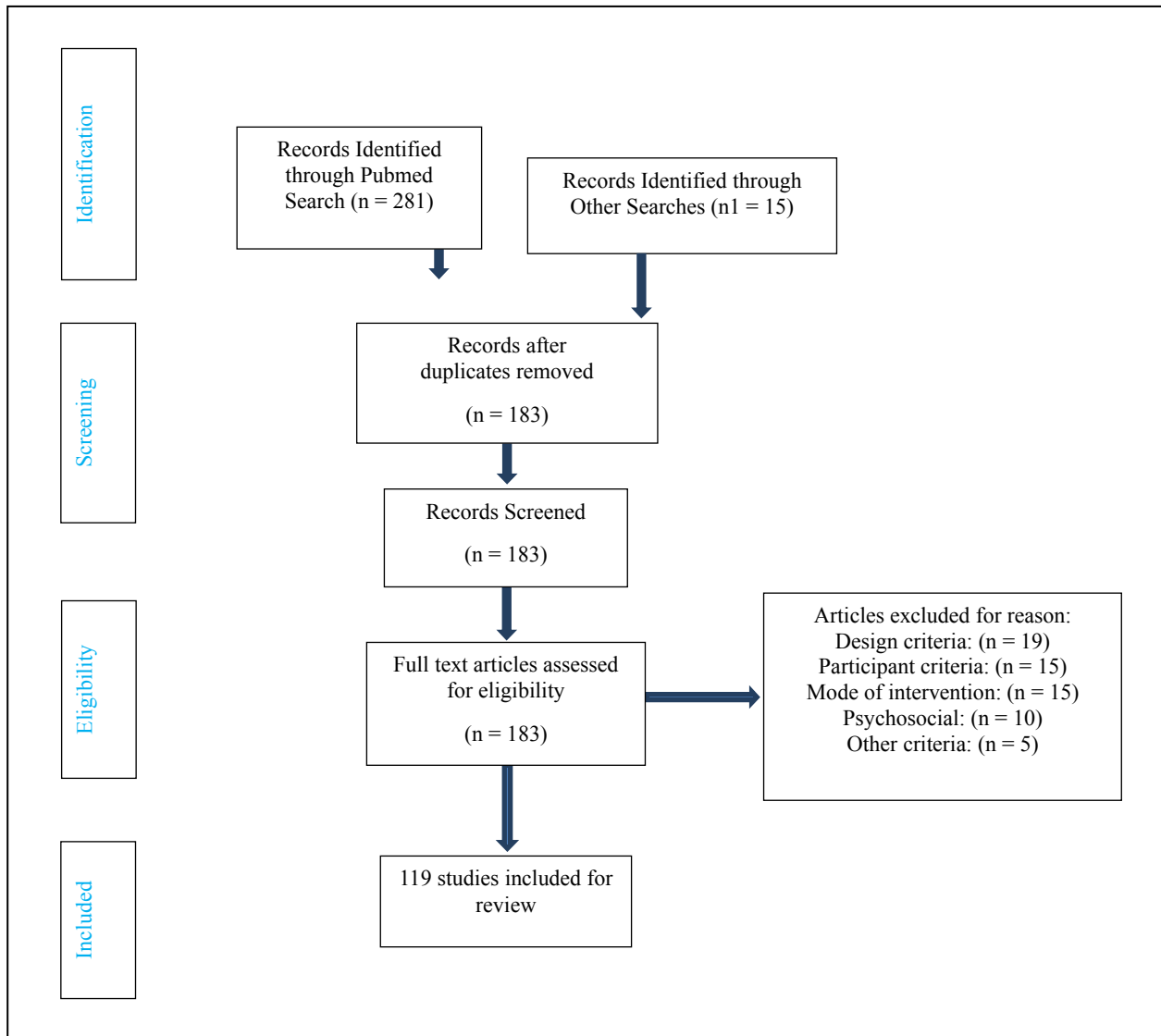


Figure 1. Decision tree for method of articles selection for review.

Table 1

*The Relationship Between Different Symptoms and Problems Individuals With Schizophrenia Face, and How These Can Be Managed Using Pharmacological and Non-pharmacological Methods*

Symptoms related to schizophrenia	Treatment/Support options	Studies supporting treatment option
Hallucination and delusions which cause inability to live independently	Antipsychotic drugs and complimentary intervention such as vitamin D or folic acid; yoga as an add-on to medications; Cognitive rehab; CBT as an add-on to antipsychotics	(Galletly et al., 2016; Cieslak et al., 2014; Mehta et al., 2016; Varambally et al., 2012; Eack et al., 2011; Subramaniam et al., 2012; Haddock et al., 1999; Kuipers et al., 1997; Sensky et al., 2000; Beck, 1952; Drury et al., 1996; Amminger et al., 2015; Hill et al., 2013; Strauss, 2013; Thomas, 1976; Waghorn et al., 2012)
Withdrawal from social life affecting friendship and relationships	Cognitive behaviour therapy; yoga as an add-on to antipsychotic drugs which improves cognitive impairment thus leading to improved relationships	(Turkington et al., 2000; Lewis et al., 2002; Varambally et al., 2012; Iyer et al., 2011; Ramsay et al., 2011)

Table 1 to be continued

Disorganised behaviour which affects day to day life	Cognitive behaviour therapy; yoga therapy; antipsychotic medications and complimentary interventions such as vitamin D or folic acid supplements	(Teesson et al., 2004; Morrison, 2009; Cormac et al., 2002; Dickerson et al., 2011)
Lack of sense of stability and security such as homelessness	Antipsychotics; CBT as an adjunct to antipsychotics	(Morrison, 2009; Jaeger et al., 2015; Teesson et al., 1990; Folsom & Jeste, 2002; Coldwell et al., 2007; Girard et al., 2017; Nelson et al., 2007)
Lack of support groups	Along with antipsychotics, CBT and yoga	(Gangadhar et al., 2012; Fontanella et al., 2014)
Lack of employment	CBT, yoga, antipsychotic medications and job training including vocational intervention program	(Kinoshita et al., 2013; Lysaker et al., 2009; Killackey et al., 2006; Major et al., 2010; Rinaldi et al., 2004; Bond et al., 2012)
Lack of education and training	CBT, yoga and antipsychotic drugs that improve cognitive impairment	(Drake et al., 2012; Lysaker et al., 2009; Vargas et al., 2014)
Lack of recreation and entertainment	CBT and Yoga—CBT addresses the issue of cognitive dysfunction and yoga contributes to sense of wellbeing that helps in having recreation and entertainment	(Beck et al., 2005)
Stigmatisation	CBT	(Koschorke et al., 2017; Świtaj et al., 2017)
Lack of public guardianship	CBT—in the absence of family support, public guardianship is very important that may be achieved by effective CBT	(Harvey et al., 2013)
Suicide prevention	CBT and antipsychotic drugs reduces suicidal ideations	(Hor et al., 2010; Mamo, 2007; Galletly et al., 2016; Bateman et al., 2007; Challis et al., 2013; Palmer et al., 2005; Preti et al., 2009)
Violent behaviour	CBT	(Large et al., 2009; Erb et al., 2001; Johnson, 2006)
Lack of exercise	CBT and yoga—they promote health consciousness	(Galletly et al., 2016)
Lack of integration with the community	Antipsychotic medications and CBT	(Eack et al., 2013; Eack et al., 2011)
Lack of overall wellbeing	Yoga	(Manjunath, 2009; Varambally et al., 2012; Nagendra et al., 2000; Walsh & Roche, 1979)
Substance abuse	Antipsychotics along with CBT or yoga	(Moore et al., 2012; Drake et al., 2007; Cather et al., 2017)

### Interventions for Schizophrenia

In this section, we will discuss the various existing therapies used for treating schizophrenia symptoms as well as problems the patients face, such as unemployment, lack of education, and lack of social relationships.

#### Pharmacological Intervention

It has been observed that full recovery from the symptoms of schizophrenia occurs in six percentage of individuals with schizophrenia after a single episode of psychosis (Morgan et al., 2014). In 39 percentage of the patients, a deterioration of symptoms has been reported (Morgan et al., 2014). Approximately, about one in seven individuals with schizophrenia achieve total recovery (Jaaskelainen et al., 2013). Table 1 identifies the issues related to holistic management of schizophrenia and associated intervention options.

The initial treatment of schizophrenia often includes various antipsychotic medications. The targets of antipsychotic medications are generally the symptoms of schizophrenia but not the root causes of it, such as stress and substance abuse (see above). As mentioned in Table 1, most antipsychotic drugs ameliorate hallucinations and delusions, while some attempt to also address the negative symptoms of schizophrenia. Antipsychotic medications are usually the only option for the treatment of schizophrenia. Most of antipsychotic treatments work by reducing the positive symptoms of schizophrenia through blocking dopamine receptors (Galletly et al., 2016).

In one research study by Girgis et al. (2011), 160 individuals with schizophrenia were randomized to clozapine or chlorpromazine treatment for up to two years. The adherence to clozapine was found to be higher than that of chlorpromazine. In another study conducted on 34 individuals with schizophrenia, it was found that there was no beneficial effect of clozapine over conventional antipsychotics (Woerner, Robinson, Alvir, Sheitman, Lieberman, & Kane, 2003). McEvoy et al. (2006) found that a large percentage of individuals with schizophrenia discontinued treatment due to the inadequate efficacy of some antipsychotic drugs. An average daily dose of 523 and 600 mg/day of clozapine has been found to be effective in the treatment of positive and negative symptoms in individuals with schizophrenia (McEvoy et al., 2006). Sanz-Fuentenebro et al. (2013) found that individuals with schizophrenia on clozapine continued their original treatment for a much longer period of time than patients on risperidone. Specifically, the retention rate for clozapine was 93.4 percentage whereas the retention rate for risperidone was 82.8 percentage. However, patients in the clozapine group normally have significant weight gain than those on risperidone (Taylor & McAskill, 2000).

In one study by Sahni, Chavan, Sidana, Kalra, and Kaur (2016), a total of 63 patients were selected and randomly allocated to either clozapine or risperidone. The two groups were similar on sociodemographic variables including age, sex, education level, occupation, income, family type, and marital status. The mean duration of illness was 19.39 months in the clozapine group, and 18.63 months in the risperidone group. There was a significant reduction of positive symptoms in both drugs. It was found that both clozapine and risperidone equally reduced positive symptoms whereas clozapine was much superior compared to risperidone in reducing negative symptoms. Clozapine has been found to reduce suicidal ideation in individuals with schizophrenia (Hennen & Baldessarini, 2005); Along these lines, Hennen and Baldessarini (2005) reported that with administration of clozapine in chronically psychotic patients has led to a reduced suicidal ideation. In fact, it was concluded that long-term treatment with clozapine resulted in a three-fold reduction of risk of suicidal behaviours. Further, patients on clozapine are often administered metformin (500 mg twice daily) to lose weight. Aripiprazole is sometime given along with clozapine to manage weight and improve metabolic parameters (Muscatello et al., 2011). In one study, Muscatello et al. (2011) found that the administration of both aripiprazole and clozapine has led to a beneficial effect on the positive and general symptoms of individuals with schizophrenia, compared to clozapine alone.

Antipsychotic drugs also help ameliorate disoriented behaviour in day-to-day life. They are also used to improve cognitive impairment, which in turn improves relationship and contributes to the attainment of education and employment. Antipsychotic drugs help improve disoriented behaviour in day-to-day life. They are also used to improve relationships and enhance education (Drake et al., 2012; Lysaker, Davis, Bryson, & Bell, 2009) and employment (Kinoshita et al., 2013). Table 1 summarizes the role of pharmacological intervention in the holistic management of schizophrenia.

### **Complementary Intervention and Diet**

Brown, Birtwistle, Roe, and Thompson (1999) found that the diets of schizophrenia patients contained more total fat and less fiber than the diets of a control group matched for age, gender, and education, although the intake of unsaturated fat was found to be similar in both groups. In another study, McCreadie et al. (1998) studied the dietary intake of 30 individuals with schizophrenia living in assisted-living facilities in Scotland as well as a control group matched for sex, age, smoking, and employment status. The majority of individuals with schizophrenia were overweight or obese, and saturated fat intake was higher than recommended in the diets for individuals with schizophrenia (Gothelf et al., 2002).

It was found that individuals with schizophrenia consumed less total fiber, retinol, carotene, vitamin C, vitamin E, fruit, and vegetables than the control group (Kalaydjian, Eaton, Cascella, & Fasano, 2006).

McCreadie et al. (1998) studied dietary habits of 102 individuals with schizophrenia with special emphasis on fruit and vegetable intake and smoking behaviour. The study concluded that the patients (especially male patients) had poor dietary choices. Graham, Keefe, Lieberman, Calikoglu, Lansing, and Perkins (2015) suggested that administering vitamin D to individuals with schizophrenia ameliorates their negative symptoms. In another study by Strassnig, Singh, and Ganguli (2005), the dietary habits of a total of 146 adult community-dwelling individuals with schizophrenia were studied. It was observed that the patients consumed a higher quantity of food that includes protein, carbohydrate, and fat than that of a control group. Such habits can lead to cardiovascular diseases, type II diabetes, and systemic inflammation in individuals with schizophrenia (Kraft & Westman, 2009). These diseases are related to a short lifespan in individuals with schizophrenia (Ran et al., 2007). In a research study by Joseph, Depp, Shih, Cadenhead, and Schmid-Schönbein (2017), it has been suggested that high-fibre diets can improve the immune and cardiovascular system, thereby, preventing premature mortality in schizophrenia.

As mentioned in Table 1, the administration of folic acid supplements may help ameliorate positive and negative symptoms in schizophrenia. Vitamin C, E, and B (including B12 and B6) were also found to be effective in managing schizophrenia symptoms (Brown & Roffman, 2014). The administration of vitamin D helps improve daily living (Cieslak et al., 2014), as mentioned in Table 1. Nonetheless, additional studies are required in order to investigate whether there is a relationship between complimentary medications and schizophrenia. Table 1 summarizes the role of complementary intervention in the holistic management of schizophrenia.

### **Cognitive Behaviour Therapy**

Cognitive behaviour therapy (CBT) is a therapeutic technique that helps modify undesirable mode of thinking, feeling, and behaviour. CBT involves practical self-help strategies, which are found to ameliorate positive symptoms in schizophrenia. CBT combines two kinds of therapies: “cognitive therapy” and “behavioural therapy”. The combination of these two techniques often enables the patient to have healthy thoughts and behaviours. Morrison (2009) summarized the use of CBT in individuals with schizophrenia to address the primary symptoms of illness as well as social impairments. Morrison (2009) mentioned that many schizophrenia symptoms are resistant to pharmacological treatment and suggested CBT as an add-on to antipsychotics can be more effective than the administration of drugs alone. For example, several studies found that cognitive rehabilitation and CBT can ameliorate cognitive deficits and in turn positive symptoms (Eack, Hogarty, Greenwald, Hogarty, & Keshavan, 2011; Subramaniam, Luks, Fisher, Simpson, Nagarajan, & Vinogradov, 2012).

There are many techniques to alter thoughts and behaviours using CBT. One research study described the key elements of CBT for schizophrenia (Tai & Turkington, 2009) and concluded that various CBT techniques can be used effectively in schizophrenia. One of the techniques, known as cognitive restructuring, includes challenging the patient to come up with an evidence to prove that their beliefs are real. This technique assists the client to realise that they have delusions. This technique assists the patient to learn to identify and challenge negative thoughts and modify the faulty thoughts with more realistic and positive ones. CBT was also found to be effective for managing homelessness. As CBT ameliorates cognitive impairment, it helps improve relationship and contributes positively to entertainment. Behavioural therapy aims to assist the patient to learn to modify their behaviour. For example, they may rehearse conversational skills so that they can use these newly learned skills in social situations. CBT assists the patients in engaging in social circles which affects friendship and relationship as indicated in Table 1.

There have been validation studies of CBT in schizophrenia over the last 15 years. In schizophrenia, CBT is one of the most commonly used therapy in the UK (generally in addition to medications) (Morrison, 2009). In fact, CBT has been recommended as first-line treatment by the UK national health service (NHS) for individuals with schizophrenia. Similarly, the American Psychiatric Association recommended CBT for individuals with schizophrenia (Jauhar, McKenna, Radua, Fung, Salvador, & Laws, 2014). Recently, the US schizophrenia patient outcomes research team (PORT) has recommended CBT for patients who have persistent psychotic symptoms (Jauhar et al., 2014).

CBT was also found to be useful in reducing disorganised behaviour which affects daily living in individuals with schizophrenia. In one research study by Wykes, Steel, Everitt, and Tarrrier (2008) in the United States and United Kingdom, it has been found that CBT is more preferred than other behavioural therapies. This study show that CBT ameliorates positive symptoms, negative symptoms, mood, and social anxiety. However, there was no effect on hopelessness. CBT sometimes includes the family of the patient in treatment session, which is why the patient and their carers usually welcome CBT. CBT brings the patient and their carers into a collaborative environment as a part of the treatment team and encourages them to participate actively in treatment . It has been found that hallucinations, delusions, negative symptoms, and depression are also treated with CBT (Sensky et al., 2000). CBT involves doing a homework which allows the patient and their carer to alleviate the distressing symptoms of schizophrenia. CBT encourages taking medications regularly and integrating with the community (Morrison, 2009). CBT has also been found to have enhanced effects when combined with antipsychotic medication (Pinto, La Pia, Menella, Giorgio, & DeSimon, 1999), as compared to the administration of medications alone.

In one study (Sensky et al., 2000), 90 patients were treated using CBT for over nine months. The therapy resulted in significant reductions in positive and negative symptoms and depression. After a nine-month follow-up evaluation, patients receiving CBT continued to improve, unlike those who did not receive CBT. In order to apply CBT to schizophrenia, a deep understanding of the patient's symptoms should be developed first (Turkington, Kingdon, & Weiden, 2006). Then, the issues related to positive and negative symptoms need to be addressed. CBT also helps reduce suicidal ideation and violent behaviour as well as encouraging individuals with schizophrenia to regularly exercise, integrate with the community, avoid stigmatisation, adopt public trusteeship and guardianship, and avoid substance abuse. Table 1 identifies the issues related to holistic management of schizophrenia and associated CBT intervention options.

### **Yoga Therapy**

Yoga therapy can also manage schizophrenia symptoms, often in combination with pharmacological medications (Jha, 2008). Pharmacological intervention alone might not produce all the desirable effects in managing schizophrenia symptoms, especially negative symptoms (Gangadhar & Varambally, 2012). Yoga, as an add-on to antipsychotic medications, helps treat both positive and negative symptoms, more than medications alone. Furthermore, pharmacological interventions often produce obesity in schizophrenia (Gangadhar & Varambally, 2012). Yoga therapy has been found to help reduce weight gain due to the administration of antipsychotic medications. Pharmacological interventions might cause endocrinological and menstrual dysfunction which may be positively treated by yoga therapy (Gangadhar & Varambally, 2012). In a research study by Gangadhar and Varambally (2012), two groups of patients on antipsychotic medications were examined. In one group, yoga therapy was administered. In the other group, a set of physical exercises were applied. Both groups were trained for one month (at least 12 sessions). The yoga group showed better negative symptoms scores than the other group. Similarly, yoga therapy resulted in better effects on social dysfunction than the other group. Along these lines, Vancampfort et al. (2012) found that practicing yoga reduces psychiatric symptoms and improves the mental and physical quality of life, and also reduces metabolic risk.

The most probable explanation of the effectiveness of yoga therapy is the production of oxytocin in the body (Gangadhar & Varambally, 2012). Oxytocin is a hormone which contributes to well-being. In one research study, 40 patients were administered oxytocin along with antipsychotic medications (Feifel, 2011). It was found that both negative and positive symptoms improved in those patients. The results of yoga therapy are manifold. Yoga therapy can lead to a reduction in psychotic symptoms and depression, improvement in cognition, and an increase in quality of life. Table 1 identifies the issues related to holistic management of schizophrenia and associated yoga intervention options.

### **Psychosocial Factors**

We have described and explained various factors to manage schizophrenia symptoms in a holistic manner. Although there are a multitude of research studies on pharmacological intervention, there are only few studies encompassing all the factors associated with holistic management of schizophrenia. Our study will attempt to provide a framework for holistic management of schizophrenia. Table 1 identifies the issues related to the holistic management of schizophrenia and intervention options for symptoms and issues most individuals with schizophrenia often face.

Based on our review (see Table 1), we found that different symptoms of schizophrenia (e.g., psychiatric symptoms, homelessness, unemployment, financial constraints, lack of education, poor relationship, among others) can be adequately addressed and managed using different methods (e.g., antipsychotics, CBT, yoga, among others). However, there are several issues like recreation and entertainment, public guardianship, and training for financial management that have not been adequately addressed in prior studies. Our study will provide a holistic account for how different symptoms in schizophrenia can be effectively managed.

Although most treatment studies focus on ameliorating positive and negative symptoms, other symptoms, such as homelessness and lack of education, equally impact the quality of life in individuals with schizophrenia. Thus, targeting these symptoms is of paramount importance. By doing so, we will be able to provide an individualized treatment for schizophrenia as well as increase the patients' participation in society. Galletly et al. (2016) provided a set of recommendations for the clinical management of schizophrenia. They adopted a

somewhat holistic view of treating schizophrenia symptoms and problems the patients face, such as unemployment. This guideline emphasizes early intervention, physical health, psychosocial treatments, cultural considerations, and improving vocational outcomes as well as collaborative management and evidence-based treatment.

As shown in Table 1, even though different treatments can manage different schizophrenia symptoms, future research should investigate whether the combination of these treatments is effective, as it is possible that combining several treatments may not lead to the same effects of each therapeutic method administered alone. For example, although 85 percentage of individuals with schizophrenia are on government support (Galletly et al., 2016), they need to manage their finances. Group homes often provide financial management. However, in order to live independently, finance management is a problem for many patients. Independent living and integration with the community are areas which need further attention and work (Eack, Mesholam-Gately, & Greenwald, 2013). Individuals with schizophrenia are often unable to run their daily chores. They need to be trained to prepare a meal, wash clothes, and administer medications. Relationship is a problem for individuals with schizophrenia. As they are unable to participate in a conversation fluently, it is difficult for many patients to form a strong relationship. Their relationship, if ever successful, often becomes weak over time and patients gradually become isolated. Since individuals with schizophrenia become withdrawn from most social activities, their friends and peers become disinterested and finally desert them. Individuals with schizophrenia often depend on close family support to survive. Table 1 describes ways to ameliorate such problems, which can help improve the quality of life of the patients. Entertainment and recreation are important element in everyday life. Individuals with schizophrenia have a fair bit of time in their hand as they are often not engaged in full-time job or any such activities. They get bored, and they need recreation as well, which is a key part of enhancing their quality of life. Hobbies and other recreational activities will help them alleviate boredom.

In our proposed framework for holistic management of schizophrenia, in addition to conventional pharmacological therapy, it is important to include other non-pharmacological interventions to assist the patients to obtain financial management, independent community living, independent living skill, insurance needs, public trustee and guardianship, relationship, friendship, and entertainment (Koschorke et al., 2017) as well as manage alcohol and other drug issues, domestic violence, and any other health problems issues.

### **Survey Methodology**

Our two international surveys will be online Internet based surveys. The survey results will be processed in two separate websites. The survey will be done amongst the professionals of English speaking countries. We are mainly targeting the English speaking countries, such as Australia, New Zealand, UK, North America, and Asia. We plan to write to the professional associations of the respective countries to request their members to participate in the survey. Additionally, we will request the potential respondents through our personal network. Considering the professional population of Australia, New Zealand, North America, Asia, and UK and average number survey responses, we are aiming a response number of around 100 for each type of survey. A sample size of 100 will be fairly representative of the opinions of the professionals for each type of survey. As the survey will be anonymous, we do not foresee any ethical issue related to the survey. Potential respondents will be assessed in country specific manner as they reflect the viewpoint of the belonging country.

### **Proposed Pharmacological Survey Questionnaire**

The proposed questionnaire is described below:

1. Country: Country drop down country list
2. Professional experience:  No. of Years

For the following drugs, please assess their effectiveness for treatment of schizophrenia as well as their side effects: in a scale of 0 to 10—0 having least effect and 10 having most effect.

3. Generic name: aripiprazole; class: atypical antipsychotics
  - 3a. Effectiveness in treating schizophrenia:
  - 3b. Overweight due to medication:
  - 3c. Effect on insulin resistance:
  - 3d. Effect on sleep apnoea:
  - 3e. Other harmful side effects:
4. Generic name: risperidone; class: atypical antipsychotics
  - 4a. Effectiveness in treating schizophrenia:
  - 4b. Overweight due to medication:
  - 4c. Effect on insulin resistance:
  - 4d. Effect on sleep apnoea:
  - 4e. Other harmful side effects:
5. Generic name: asenapine; class: atypical antipsychotics
  - 5a. Effectiveness in treating schizophrenia:
  - 5b. Overweight due to medication:
  - 5c. Effect on insulin resistance:
  - 5d. Effect on sleep apnoea:
  - 5e. Other harmful side effects:
6. Generic name: quetiapine; class: atypical antipsychotics
  - 6a. Effectiveness in treating schizophrenia:
  - 6b. Overweight due to medication:
  - 6c. Effect on insulin resistance:
  - 6d. Effect on sleep apnoea:
  - 6e. Other harmful side effects:
7. Generic name: clozapine; class: atypical antipsychotics
  - 7a. Effectiveness in treating schizophrenia:
  - 7b. Overweight due to medication:
  - 7c. Effect on insulin resistance:
  - 7d. Effect on sleep apnoea:
  - 7e. Other harmful side effects:

Please assess the effect of following complimentary medications in the treatment of schizophrenia in a scale of 0-10—0 being the least effective and 10 being the most effective.

8. Vitamin B:
9. Folic Acid:
10. Fish Oil:



11. Glycine:
12. Vitamin C:
13. Vitamin D:
14. Vitamin E:

### **Proposed Non-pharmacological Survey Questionnaire**

The non-pharmacological survey questionnaire is described below:

1. Country: Country drop down list
2. Years of professional experience:  No. of Years

Please assess the following therapies in their effectiveness for treatment of schizophrenia in a scale from 0 to 10—0 being least effective and 10 being most effective.

3. Cognitive Behaviour Therapy (CBT):
4. Yoga Therapy:
5. Tai Chi:
6. Art Therapy:
7. Music Therapy:

Please assess the importance of following factors in the overall management of schizophrenia in a scale of 0 to 10—0 being least important and 10 being most important.

8. Stable and suitable accommodation:
9. Provision of education for future career:
10. Availability of job training:
11. Availability of employment:
12. Provision of recreation:
13. Provision of entertainment:
14. Imparting day to day living skill:
15. Arrangement of independent living skill:
16. Facility for integration with community:
17. Arrangement for suicide prevention:
18. Imparting knowledge about controlling violent behaviour:
19. Imparting knowledge about bad consequences of smoking:
20. Arrangement of knowledge about substance abuse:
21. Arrangement of coordination between various service providers:
22. Arrangement of public guardianship:
23. Arrangement of public trusteeship:
24. Organising facility for physical exercise:
25. Arrangement for familiarity with issues of stigmatisation:
26. Arrangement of healthy relationship:
27. Arrangement of friendship:
28. Arrangement of sense of overall well-being:

## Survey Results Analysis

After the survey responses are collected, we will calculate mean, median, mode, standard deviation, and net promoter score and we will rank the survey responses in order of their statistical significance.

### Net Promoter Score

Net promoter score (Reichheld, 2003) is a significant element to capture practitioners' experience and used widely in various industries. A brief description of net promoter score is given here. Net promoter score (NPS) is practitioners' experience. It is a proven metric that forms the core of the experience programs over the world. For the questions asked, respondents answer this question on a scale from 0 to 10, where 0 represents "least important" and 10 represents "highly important". Those who respond with 9-10 are called "promoters", 7-8 are "passives", and 0-6 are "detractors". The NPS is determined by subtracting the percentage of detractors from promoters. Respondents are grouped as follows:

- (1) Promoters (score 9-10) are respondents who feel very strongly about the issue;
- (2) Passives (score 7-8) are satisfied but do not feel very strongly about the issue;
- (3) Detractors (score 0-6) are respondents who feel poorly about the issue.

Subtracting the percentage of detractors from the percentage of promoters yields the net promoter score, which can range from a low of -100 (if every practitioner is a detractor) to a high of 100 (if every practitioner is a promoter).

NPS will signify the type of preferences of the various factors in the survey responses.

### Ranking of the Factors

In pharmacological survey response analysis, based on their statistical significance, each drug will be ranked in order of their popularity for effectiveness in treatment of schizophrenia as well as harmful side effects. This comparative study will highlight the efficacy of the chosen antipsychotic drugs in treatment of schizophrenia symptoms. In non-pharmacological survey response analysis, each therapy will be ranked in order of their preferences based on their statistical significance. This will signify the effectiveness of different therapies in holistic management of schizophrenia in order of preference and effectiveness. The other psychosocial factors, such as accommodation, education, and job training, will also be ranked in terms of their statistical significance. This will assist to allocate relative importance to the chosen factor in holistic management of schizophrenia.

## Discussion

We have described and explained various factors to manage schizophrenia in a holistic manner. It may be mentioned that although there is widespread research and studies into pharmacological intervention, there are not many studies encompassing all the psychosocial factors associated with holistic management of schizophrenia. We have provided a framework for holistic management of schizophrenia and formulated a mechanism to evaluate the comparative significance of each factor in the holistic management of schizophrenia. Once we receive the responses of these two surveys, we will analyse them as described above. The results will assist to allocate relative importance to the respective factor controlling effective overall management of schizophrenia. This allocation of relative importance is very vital for effective management of schizophrenia. Thus this study will contribute positively to the improvement of quality of life for people with schizophrenia.

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# Data Visualization in Evaluating Service Delivery

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The delivery of human services has become highly complex and is increasingly reliant on the capacity of experienced local service providers to evaluate complex datasets so as to provide adequate decision-support for critical and costly service delivery needs. Traditionally, localized human service agencies which are of relatively small size have limited resources and must control administrative expenditures to provide human services.

*Keywords:* performance evaluation, computing, data visualization, group evaluation, human service delivery

## Introduction

Human service and health service organizations are in critical need of developing best practice, technical and evaluative tools, that keep pace with rising social expectations for evaluation of health and service delivery methods. The needs and numbers of health service recipients are changing dramatically in recent decades. Contemporary life for the most needy of our world's residents has become more urgent and critical with respect to responding to seemingly pandemic suffering, oppression, and inequities related to the disparities of inconsistently distributed goods and services. Geopolitical events, and economic and natural catastrophes have created reservoirs of expectant and well-deserving people who are increasingly relying on social workers and other human service providers, to assist them in individual and collective humanitarian collective recovery efforts (Basham & Diaz, 2005). Though data visualization has been well received and integrated into medical service care, computing science, and engineering, and meteorology, it has received less attention in the delivery of social service and the exploration of data or evaluation of data to determine service delivery effectiveness. Data visualization can be utilized to determine whether service recipients are receiving equivalent benefit or outcomes through multilevel graphical evaluation methods using available desktop computing technology (Jelen, 2015).

Small or rural agency health and human services providers of service delivery methods and interventions often remain to some extent mired in the service delivery and service evaluation technologies and traditions of the middle of the last century. These service providers are challenged in the effective delivery of services by increasing service need and static unchanging delivery and evaluative methods. Transforming current and emerging technologies to serve the needs of the many and to provide meaningful decision-support methods for service providers, knowledge developers, and educators in meeting these needs has never been more vital (Patterson & Basham, 2003). There is sufficient service need for smaller human service delivery organizations to move reduce dependence on proprietary and expensive data analysis packages and to utilize more available spreadsheet applications which are affordable and represent both emerging and substantially improved tools for educating health care practitioners and as tools for evaluating practice and service delivery.

This paper addresses emerging best practices in the incorporation of widely available desktop computing technologies to provide data visualization or graphical representation methods to evaluate services to small groups of health and social service recipients, within less developed service delivery agencies. This session will also present discuss and demonstrate methods being developed at the University of Texas at Arlington, School of Social Work to utilize data visualization methods to evaluate small group service delivery efforts and to utilize spreadsheet methods of analyzing data in a widely available desktop computing application (Microsoft Excel) as an alternative to expensive specialized data analysis packages. The presentation will demonstrate graphical representation methods of visually evaluating process and outcome simultaneously over time, as well as evaluating multiple units of analysis or levels of service graphically. Furthermore, multimedia modules are demonstrated that rapidly teach complex computing procedures using spreadsheets to analyze common human service data problems (Basham, 2002).

Digital or e-learning strategies, incorporating widely available graphical representation tools to evaluate service, combined with streaming audio and video modules to teach, or transfer complex evaluative data analytic technologies and knowledge show promise of greatly improving service delivery and service related education relative to evaluation. Social service delivery need are rapidly changing as service providers become accountable primarily to service constituencies competing for a greater share of service delivery and goods, regulatory boards, payers of funded services, and face increasing legal challenges to service equity and effectiveness. Therefore, this paper addresses two recent integrations of best practices in desktop computing technologies to both render graphical representation for data to assist practice and administrative decision support and evaluative service to smaller service agencies using spreadsheet computing.

### **Method 1: Data Visualization in the Evaluation of Service Delivery**

A study was undertaken to determine the utility of widely available desktop computing technology to provide graphical representations of data sufficient to provide rich contextual and multilevel evaluative information to educators on the development of cohesion and dimensions of group process at the level of individuals and groups simultaneously. Measures of comparative group leadership across multiple group service offerings using the spreadsheet tools and graphing capacities of the Microsoft Excel application were also evaluated. The project entitled "Data Visualization: Graphical Representation in the Evaluation of Experiential Group Therapy Education Outcomes" (Basham, 2002; Patterson & Basham, 2002) is summarized.

#### **Purpose**

The purpose of the study was to quantitatively and graphically evaluate the usefulness of data visualization methods to represent group level change over time. Group level educational outcomes were analyzed by using conventional data analytic methods for time series data and through use of widely available computing technology, to graphically represent change over time (see Figures 1 and 2). Figure 1 depicts the capacity of the spreadsheet package to render data visualization that captures group turbulence and cohesion across time using a moving standard deviation via a standard deviation enhanced line graph (SDELG), computed, and graphed across multiple periods of observation.

#### **Methods**

This paper reports findings from group level time series data for 16 experiential group therapy education groups that included 249 subjects and were evaluated using quantitative and visual analytic procedures.

Quantitative analytic procedures included: descriptive and inferential analysis to demonstrate limitations to statistical conclusion validity when working with non-probability samples, psychometric reliability, and validity analysis of the survey instrument to include an exploratory principal axis factor analysis. Visual analytic procedures included traditional methods of visual evaluation of single subject information, as well as, less common graphical representation methods.

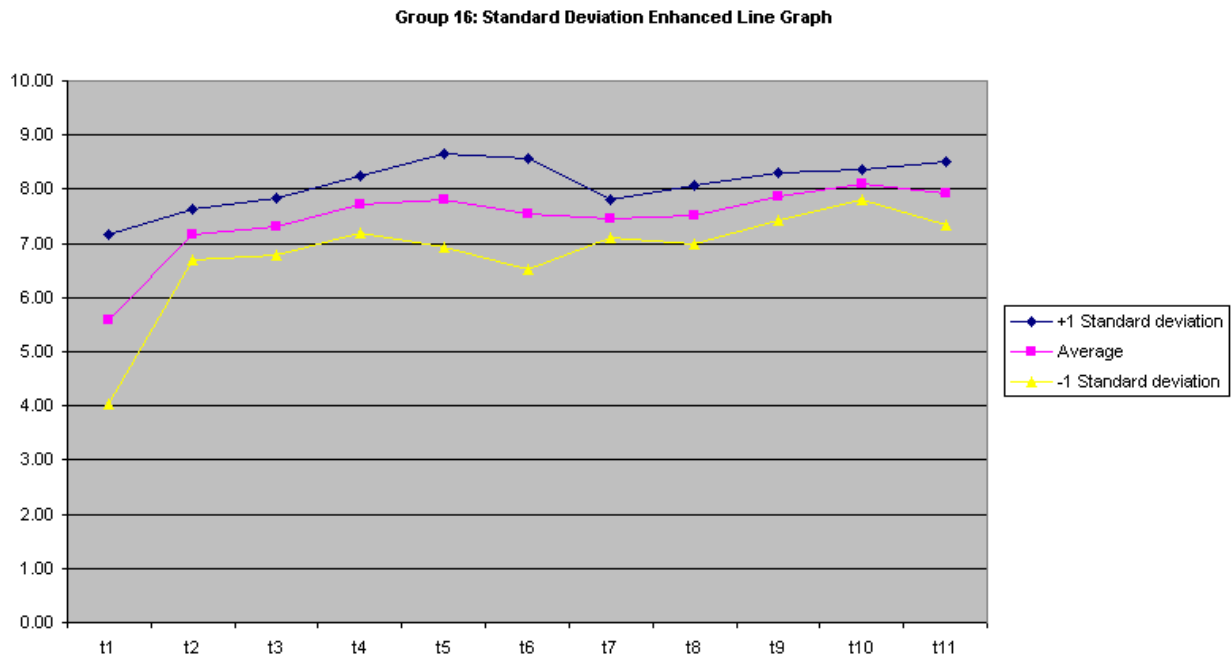


Figure 1. Group 16 (Excel)-SDELG: Concordance and variation of group satisfaction across weeks (Traditional single subject line graph of group score average per time of observation is not shown).

## Results

The resultant graphical representation demonstrates the difficulty of using statistical analysis procedures with non-probability samples. Psychometric analysis of the survey instrument though suggests a highly reliable group level evaluative instrument (coefficient alpha  $r = 0.90$ ). Data visualization methods simultaneously illustrated levels of group participant concordance and variability over time. Graphics were also generated that demonstrate the proportional contribution of multiple variables to group outcomes over time and the simultaneous display of process and outcome indicators over time. Furthermore, methods presented demonstrated the capacity to represent multiple units of analysis over time, and multiple groups of non-equivalent duration, for comparison across time. Figure 2 demonstrates comparative leadership scores averages plotted on a three dimensional surface plot for group leaders conducting educational training groups across time with groups of differing numbers of total group meeting sessions.

## Implications for Practice

Findings indicate that data visualization methods are highly useful in evaluating and understanding the complexities of multilevel data common to the delivery of group services. Graphical understanding can be improved further by the inclusion of relevant data analytic procedures to identify statistical conclusion validity issues.

**Multiple Groups: Surface Plot-Group Mean Satisfaction by Variable Length Groups and by Leaders Across Weeks**

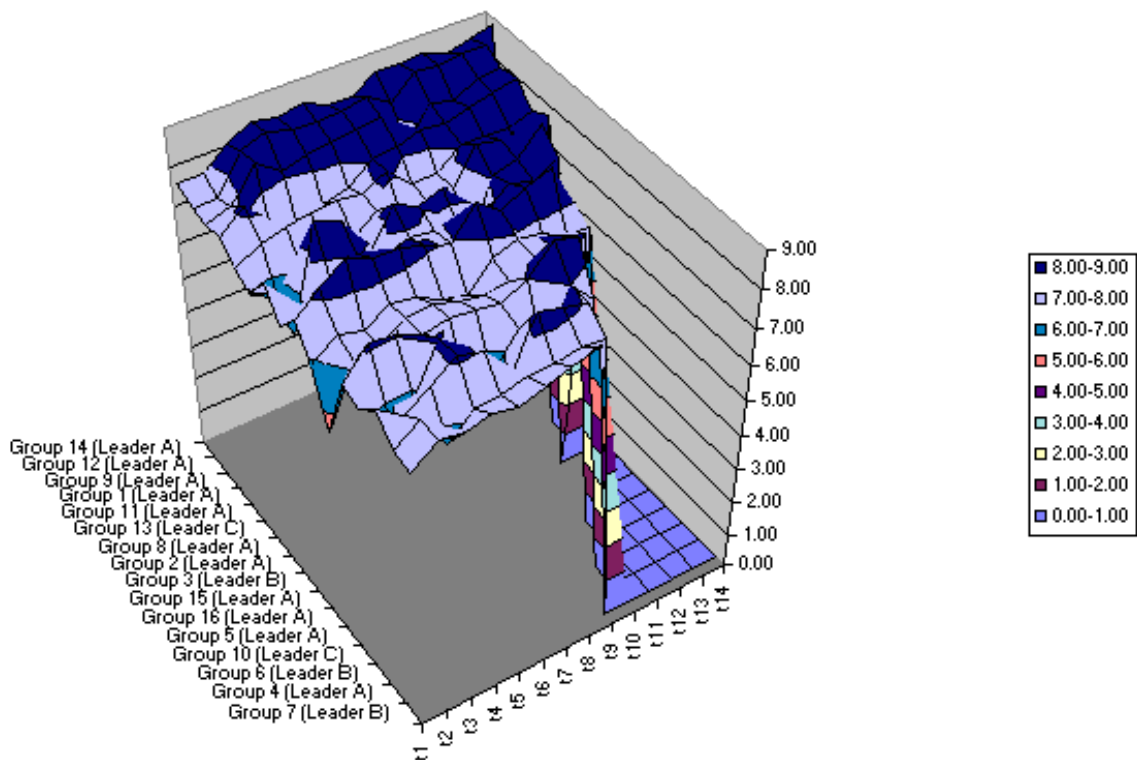


Figure 2. Multiple Groups (Excel)-Three-dimensional surface plot: Group satisfaction by group leaders.

**Method 2: Data Visualization in Educating Service Providers in Data Analysis**

Microsoft Excel spreadsheet application also have a number of advanced statistical function, the capacity for pivot table reports and charting, and advanced add in statistical computing modules already contained within the program. However, unlike commonly used advanced statistical computing packages, these spreadsheet statistical computing options are not conveniently menu driven. However, the graphical and data visualization options are generally and greatly enhanced, as compared to common social science oriented academic statistical computing packages. Using screen capture technology and streaming audio and video modules the e-learning oriented educator can provide screen capture instruction with audio direction so that the student can quickly master essential statistical computing skills on an application that is generally available throughout most smaller scale human service delivery organizations. The integrated graphing package can also provide highly useful data exploration, trend analysis, and visual confirmation to provide enhanced decision support for vital human service delivery and intervention effectiveness evaluation.

Service delivery knowledge development is partially constrained by the fact that service providers are not well-prepared to conduct data analysis with the most commonly available desktop technology applications, such as the spreadsheet. In the education of service providers, statistical software packages, such as Statistic Package for Social Science (SPSS) or Statistical Analysis System (SAS), are commonly used to teach data analysis and statistical procedures (Dzemyda, 2005). Statistical software packages commonly used for

advanced service practitioner education are both expensive and commonly unavailable in most small-scale service delivery settings. Educators can readily integrate spreadsheet data analysis into research and statistics courses with the likelihood of greater utility for small agency service providers and greater post-graduate generalization to the service delivery environment (Patterson & Basham, 2006a).

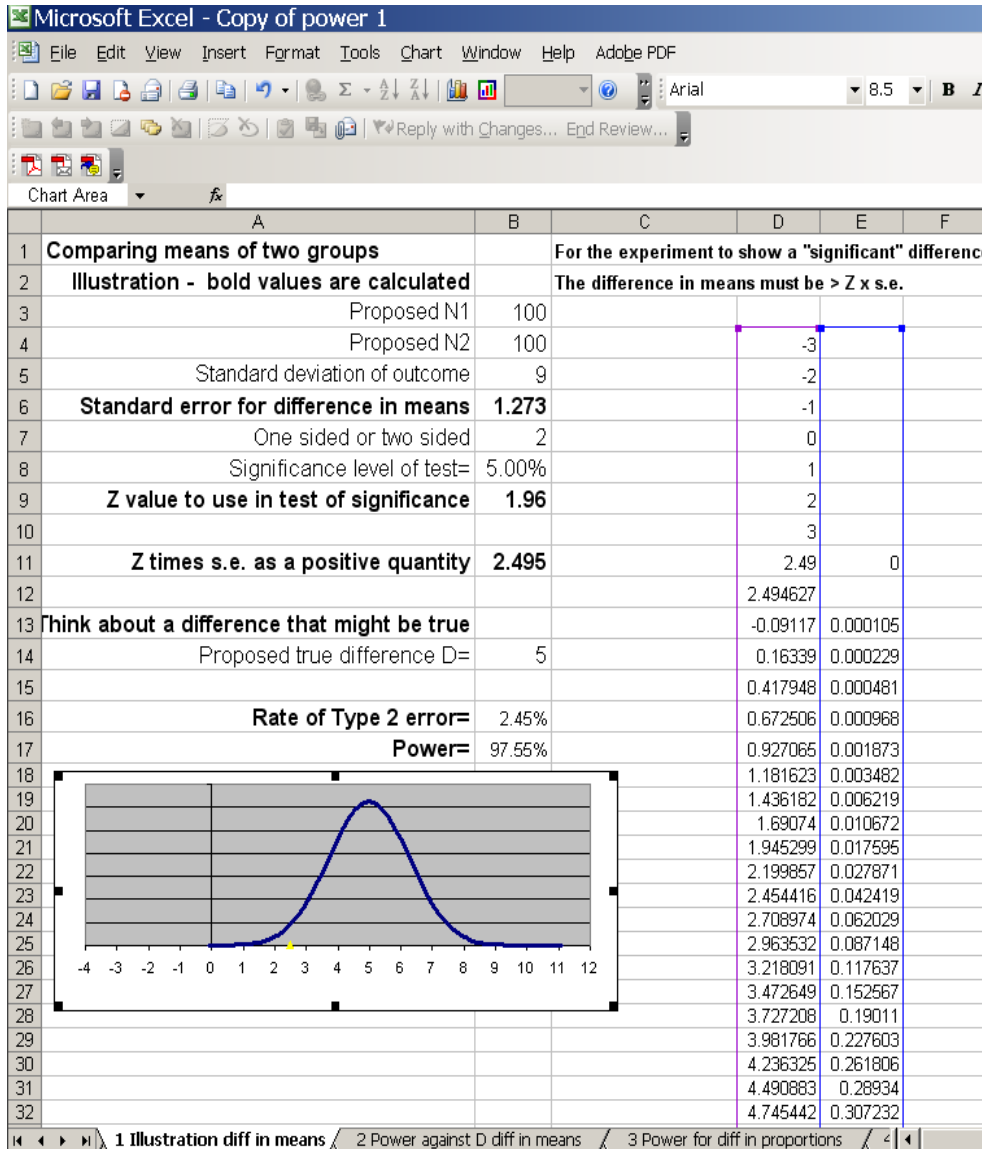


Figure 3. A screen capture of a statistical procedure along with a graphical representation.

Instructors can quickly master the complexities of statistical and data analysis tools available in spreadsheet software. These available tools include spreadsheets in data collection, sampling, data cleaning, frequency distributions, histograms, descriptive statistics, inferential statistics, bivariate statistics, pivot tables (cross-tabs), single system designs, correlation, and graphical representation of results (Basham, 2001). Additional support tools available for educators and e-learning students include sorting procedures, pivot tables, functions, statistical analysis tools, auto filters, and chart wizard (Broman & Woo, 2018). By organizing learning module a portable or web based delivery media, the instructor can make audio and video learning

modules available for rapid replication and learning, as well as providing a means for skill generalization independent from the classroom setting. In Figure 3, a comparison of means of two groups using a spreadsheet has been screen captured, but may also be captured by screen recording software to demonstrate each cursor move of the instructor and each dialog box decision in setting up the problem. The screen animated capture can also be dubbed, with voice over technology providing a complete learning module (Patterson & Basham, 2006b).

### **Discussion**

Results from the first method or study indicated that data visualization methods are highly useful in evaluating and understanding the complexities of multilevel data common to the delivery of group services. This is especially true when the survey or measurement instrument of the group attribute of interest is a highly reliable measurement or assessment instrument. Graphical understanding can be improved further by the inclusion of relevant data analytic procedures to identify statistical conclusion validity issues, especially when non-random samples are not available for evaluation (Wagner & Keisler, 2006). Human service workers and those providing group services to large populations, such as human service programs are in need of developing practice accountability strategies to evaluate group services that include data visualization methodology. These graphical innovations provide additional data exploration capacity and contribute greatly to understanding of data when the graphic selected is consistent with the type of data to be evaluated and adheres to graphing conventions, such as reporting test statistics in context with the presentation of the graphic. This exploratory study does not resolve, however, those issues of best utilization of graphic type per problems of interest that will require additional field level investigation. However, the question of acceptance by various practitioners and ease of use must be deferred here pending further study.

The second method of educating service providers through e-learning modules to evaluate services using statistical software and graphing technologies found in a widely available desktop computing technology also offer greater generalization capacity into the service delivery environment. Spreadsheet technology may be a cost effective and quickly transferable method of providing skill sets needed for consistent decision support in the provision of human services. Digital multimedia modules containing animated screen captures and voice instruction may be taken to the work environment and reviewed and then implemented over short period. Service evaluators can select only those modules or data analytic and graphing capacities relevant to a specific problem in the field environment.

### **Conclusion**

Utilizing modern data analytic software that is widely available (MS Excel), behavioral scientists and other service delivery professionals can evaluate multiple units of analysis across multiple groups, multiple dimensions of measurement, and across time while limiting possible ecological fallacy interpretations. Complex performance data can be rendered through advanced graphical representation tools that are color enhanced, rendered in three dimensions, and with rotatable axes that permit improved clinical and statistical conclusion validity, even for replicated observations, through visual inspection and analysis. Service providers and behavioral health specialists can readily determine differences between individual comparative performance and group level comparative performance across time. Examples of fully rotatable three-dimensional graphical representations of performance and be rendered offering improved understanding

of complex human performance issues. Methods of developing and utilizing these tools and be developed into learning modules for training purposes using also widely available voice over and screen capture tools.

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