An Investigation of Metacognitive Bias in Permanent Employees: The Cognitive-Emotion Nexus

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The current study aimed at investigating the relationship between elements of cognitive processing, emotional strategies of coping, and to show cognitive dysregulation in permanent employees. More specifically, the current research examined the mediating role of metacognitive components in developing negative beliefs about thoughts, further exploring moderation across gender. The sample (N=514) was purposively selected from various local organizations in Pakistan. The data was analyzed using SPSS and AMOS software (version 22). The results indicated significant gender differences in worry and emotion oriented coping. Findings through structural equation modelling revealed that mediated relationship between positive beliefs, emotional coping and negative beliefs was significantly moderated by gender. Conversely, negative beliefs about the harmfulness of thoughts were found to be affecting the females less, suggesting males to hold higher risks of dysregulation.

Keywords: Cognitive bias; Self-regulation; Mediation; Moderation; Mediated moderation; Metacognitions; Positive Beliefs about Rumination; Coping; Thought Control[1].

The evidence for cognitive bias in emotional regulation and information processing has been provided in past inquiries but a comprehensive inclusion of features of cognitive bias has been deficiently addressed in previous research (Dalgleish & Werner-Seidler, 2014). Cognitive bias refers to an alteration of knowledge from an actual version to that aligned with ones' beliefs (Ghosh & Gilboa, 2014). Deficits can be identified in research with reference to the role of beliefs in producing

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cognitive bias (Willard & Norenzayan, 2013). Cognitive bias has been explained within the multi-architectural cognitive framework of information processing model by Wells and Matthews (1996). The functioning of a cognitive bias includes involvement of executive metacognitive functions. The metacognitive model explains this with relative inclusion of automatic and conscious information processing.

The current research maintains that self-knowledge or the self-beliefs lay the *bias* for metacognitive processing. According to Conway and Loveday (2015) self-beliefs represent previous experiences, knowledge or reference for current events. The beliefs assist in appraisal of events, selection of a coping strategy and can be positive or negative in valence. The positive beliefs indicate an advantageous purpose served by the belief while negative beliefs are indicative of harm (Wells & Davies, 1994). The earlier research has highlighted the functional roles of executive mental components within various scenarios however the interaction between self-beliefs and executive functions completes the richness of cognitive experiences (Baumeister & Vohs, 2003). The present study presumes that holding positive beliefs about worry (that the worry is genuine and enables one to prepare) causes emotion oriented coping (EOC), furthering worry as a coping method and initiates control on thoughts. Subsequently, it may lead to the development of negative beliefs about thoughts.

The cognitive machinery is activated though sensory data from environmental stimuli or as stress provoking triggers are appraised. The automatically detected sensory input is processed by the executive functions for example, memory, attention, thinking, perception and previous learning (Inzlicht, Bartholow, & Hirsh, 2015). In particular, memory retrieves previous references of the incident and evaluates past linkages and coping strategies enriching the in-coming information by associating additional affective valence of earlier confrontation with similar encounters (Anderson & Bower, 2014). The choice of current coping strategy is decided after the executive functions have explored and retrieved pertinent information from executive functions and prior self-beliefs. An important feature of this system is the feedback loop that exists between self-beliefs and coping enabling the metacognitive activity, engaging previous beliefs and forming new ones after significant learning (Norton & Abbott, 2016). Currently, the research proposes that when coping method is based on positive beliefs about worry, the emotional dysregulation is likely.

The metacognitive feedback loop indicates a repetitive act of information flow to and from the self-beliefs that facilitates metacognitive appraisal and coping choice (Caselli et al., 2017). The executive functions remain in a state of activation until the discrepancies are resolved and self-regulation is attained (Voigt, 2017). The aforementioned state at metacognitive level refers to a ruminative cycle. This metacognitive activity may prolong in an event of faulty appraisals i.e., intrusive or anxious thoughts and worry, eventually leading to the formation of beliefs (negative) that signify harm and uncontrollability of negative thoughts, allowing for further planning and monitoring towards attaining a state of self-regulation (Vohs & Baumeister, 2016). The self-beliefs directly impact the information received from the lower cognitive networks. This type of mental processing is particularly relevant amidst a competitive environment, especially where the work task success and failures may have consequences attached to them. Therefore, private organizations were more suitable to capture cognitive processing.

Rationale of the Study

According to Butler (2015) self-beliefs are responsible for narrowing the attentional focus into belief-congruent information. Hence, the executive functions play their role in-line with the pre-existing self-beliefs and practice monitored information processing of events. The cognitive self-regulation has been described as universal to human functioning. Conversely, the literature indicates gender differences in information processing amongst males and females (Izard, 2013). Previously, females have been shown to be more pronounced in emotion oriented situational coping while males show higher task focused coping styles, however, this is scarcely explored within a work environment sample (Dardas & Ahmad, 2015). This unique feature logically compels differences in the information processing; consequently, it is presumed that emotional coping is more likely to predict negative beliefs however the relationship will be mediated by the type of metacognitive coping and moderated by gender.

According to Colombel (2007) memory plays the same function with reference to creating bias in the context of maintaining affect. The identification of affect-congruent information by cognitive appraisal suggests that attention is approximated to a selective portion of the experience that invokes confirmation of self-beliefs. The present study aimed to explore the relationship between negative beliefs and metacognitive dimension of social control, emotional coping and anxious thoughts. The model represents a serially mediated association between

variables while investigating the moderating role of gender. The current model has sparsely been a subject of inquiry hence, findings from present study will enable important practical implications.

Objectives

The major objectives of the present study were to explore the moderation of gender within the mediated relationship between positive beliefs about worrying, coping strategies and consequent formation of negative beliefs i.e. negative automatic thoughts. It was also intended to determine which of the coping strategies e. g., emotion oriented coping (EOC), controlling intrusive thoughts or worrying was found to play a significant role in the negative beliefs/thoughts across gender.

Hypotheses

- Womenwill score higher on positive beliefs, worrying, control of intrusive thoughts, emotion oriented coping and negative beliefs than men.
- Gender will moderate the relationship between positive beliefs and worrying, positive beliefs and control of intrusive thoughts and positive beliefs and emotion oriented coping.
- Men will reflect less worrying and emotion oriented coping while elevated control of intrusive thoughts and consequently less negative beliefs compared to female employees.

Method

The present study followed a cross-sectional, correlational research design. The data was collected using self-report inventories designed to examine the cognitive processing and coping strategies.

Participantsand Procedure. The sample consisted of 514 professionals. Women (26%) and men (64%) were chosen through purposive sampling technique from various organizations ofPakistan. The essential criteria for selection were minimum academic requirement of graduation and working as full-time employees in any capacity or department with at least 1-year of experience in the current organization. The present research specifically considered employees from private organizations. The age of theparticipants ranged between 30- 50 years; majority of them were married (89%), with an average total experience of approximately 10 years. The authorities of the organizations and institutions were approached, and formal permission was acquired before data collection. The informed consent was obtained from participants and they were

assured of the confidentiality of the information collected. The participants took approximately 10minutes to complete the entire questionnaire.

Measures

Emotion-Oriented Coping (Coping Inventory for Stressful Situations, CISS). The Coping Inventory for Stressful Situations was developed by Endler and Parker (1994). It is a 48- item scale that measures coping styles on a variety of stressful situations. The CISS has 5- point Likert scale with choices ranging from 1 = not at all to 5= very much, assessing individuals according to three basic coping styles i.e., *task-oriented coping*- (16 items), *emotion- oriented coping*- (16 items) and *avoidance- oriented coping*- (16 items). The internal consistency for the three dimensions ranges between .81 to .90 while the test-retest ranges between .55 to .73 (Endler & Parker, 1993). In the current research, the emotion- oriented coping subscale was used to meet the objectives of the study.

Negative Beliefs about Rumination Scale (Papageorgiou & Wells, 2001)**.** Negative Beliefs about Rumination Scale (NBRS) evaluates the negative metacognitive beliefs about rumination. The NBRS is a 13-item scale consisting of two subscales i.e., positive beliefs about rumination (PBRS) and negative beliefs about rumination (NBRS). The NBRS subscale further has two subcategories that assess metacognitive beliefs about uncontrollability and harm associated with rumination while the second subscale (NBRS2) assesses interpersonal and social consequences. The respondents indicate the extent to which they agree with the items on 4-point rating scale ranging from 1 = do not agree to 4 = agree very much. The scale shows good reliability and validity measures for the entire scale (Luminet, Papageorgiou, & Wells, 2004).

Metacognitions Questionnaire-30 (Wells & Cartwright-Hatton, 2004)**.** The metacognitions questionnaire (MCQ-30) is a shorter form of the original 65-item metacognitions questionnaire. The MCQ-30 consists of 30-items on several dimensions of metacognition comprising five-subscales. The subscales are positive beliefs about worry (e. g., "worrying helps me to get things sorted out in my mind"); negative beliefs about thoughts relating to uncontrollability and danger (e. g., "My worrying thoughts persist, no matter how I try to stop them") , negative beliefs about the outcomes of not controlling thoughts ("If I could not control my thoughts, I would not be able to function"); and lack of cognitive confidence on memory and attentional capabilities ("I do not trust my memory"). The items are scored on 4-points Likert-type scale from 1 = do not agree to 4= agree very much. To meet the objectives of the current

study positive beliefs about worry and control of intrusive thoughts wereemployed to test the hypothesized model.

Thought Control Questionnaire. The Thought Control Questionnaire (TCQ) is a 30-items scale devised by Wells and Davies (1994). The TCQ consists of five dimensions namely distraction, social-control, worry, punishment and reappraisal. These dimensions indicate strategies used to control one's unwanted thoughts. The TCQ consists of 4-points rating scale ranging between 1= never to 4 = almost always. The scale shows good internal consistency measure for the entire scale, alpha values ranging between .64 and .79. The subscale of *worry* was used to meet the objectives of the current study.

Results

The study scales were assessed for internal consistency and showed an adequate internal consistency with coefficients ranging between .76 and .82. There were significant positive associations between study variables suggesting weak to moderate ($.29 < r < .55$) linear relationships between variables.

The main objective was to investigate the moderating effects of gender on the mediated relationships within the proposed information processing model. It was hypothesized that the relationship between PBW and NBRS is mediated (parallel) by worry, control of intrusive thoughts and emotion oriented coping. The path model was designed in AMOS (version 22). The direct and indirect effects were assessed considering two-tailed significance for indirect paths, estimated at 95% confidence interval using 500 bootstrap samples. The fit indices provided acceptable fit for parameter estimates that were significant at .01 levels.

In the second step, the model was further revised to estimate moderating role of gender for both direct and indirect effects. Gender was used as grouping variable and model was executed with open estimates for both males and females. The model-2 represented an exceptional fit of indices with variety of relationships across paths and gender. The results showed significant mediation between positive beliefs about worry and control of intrusive thoughts, worry and negative beliefs about rumination through emotion oriented coping for males specifically, while all above paths were found nonsignificant for females highlighting mediated moderation across gender. In the third step, all parameters were constrained to be equal across male and female participants. The chi squaredifference was estimated between model with open estimate and model with equality constraints. The results indicated that there was no difference between groups at the model level conversely suggesting that

several paths may be dissimilar, indicative of model generalization. The model comparison fit indices are presented in table 3. In conclusion, the results represented mediated moderation within various paths of the entire model specifying that the same mediated relationships between variables are moderated by gender.

In addition, the gender wise comparison of parameters showed significant moderation for the relationship between positive beliefs about rumination and negative wellbeing serially mediated by metaworry and emotion oriented coping. Again the indirect path with the serial mediators appeared to be significant for males participants only (β = .02, p<.01).

Discussion

The present research indicates some important associations signifying executive metacognitive activity. The study explored the emotional regulation through information processing mechanism as a function of metacognitive beliefs, in terms of gender differences. According to some researchers (for example Robichaud, Dugas, & Conway, 2003), women tend to worry more than men particularly when coupled with positive beliefs. Presently, comparable results were revealed within the causal chain of the study variables. The findings suggested firm connections between preexisting knowledge in form of beliefs and situational metacognitive processing.

The relationship between positive beliefs about worry and control of intrusive unwanted thoughts was mediated by emotion oriented coping, while further moderated by gender. The females were found to be benefitting from emotion oriented coping. It was observed that in females the association of positive beliefs with thought control strategies was found buffered while, emotional processing in males led to an intensified thought control practice that further amplified the prediction of danger and uncontrollability of unwanted thoughts in terms of negative beliefs about ruminative thoughts.

Furthermore, when the entire model was considered for an overall effect on negative beliefs, the study showed that females were able to moderate the beliefs about danger and uncontrollability of unwanted thoughts significantly though the same metacognitive mechanism compared to males. The males represented considerably twice the amount of variance explained in the negative beliefs when compared to females. The current study highlights a crucial aspect of metacognitive activity with respect to gender. The findings supplement previous studies by extending that women may have been previously indicated to worry more than men (Zweig, 2015) however, the emotional processing and coping contributes

to a buffering effect in women. Conceivably, this can be attributed to the emotional sharing i.e., women avail emotional shoulders more than males (Caldwell & Peplau, 1982) that explains a nonsignificant score on the thought control strategies in females. The thoughts are never entirely controlled due to emotional discharge.

The males on the other hand are often cited to practice task focused coping in stressful or challenging situation (Carver & Scheier, 2014). It was detected that when using emotion oriented coping the males were found to predict negative intrusive and unwanted thoughts significantly. The same paths were nonsignificant in females that indicate that men may not typically employ emotion oriented coping however it is more beneficial for the males compared to females. The females have natural tendency to cope emotionally therefore the relationships were found to be ineffective in causing moderation. Subsequently, it can be concluded that females become more prone to developing negative beliefs that may further lead to fairer probability of developing psychopathology in the longer run. The study implies that greater emotional coping, and expression of emotional content serves a cathartic value in males which was also responsible for moderation.

Implications and Recommendations

The results of the study imply various findings; first, the findings verify a significant difference in the coping strategies used by males and females within organizational settings for organizational challenges. These differences are therefore the drivers behind generating harmful thoughts and negative beliefs specifically liable to affect mental wellbeing.

Previously, males were shown to be less emotional and more problem focused in their approaches. However, current findings imply that when men use worrying or controlling their thoughts as a coping method, they are more likely to develop negative thoughts and harmful beliefs that mentally create automatic negative thought patterns. This is indicative of a ruminative cycle that hinders reasonable problem solving. Cognitive processing along such a pattern leads to various psychological consequences e. g. depression, anxiety, or obsessive compulsive disorder even when they are working in an everyday work environment.

Thus, the findings suggest potential wellbeing threats present within work environment that are inherent in the choice of coping, further indicating that employees may benefit from trainings based on SM and employee counselling services.

References

Anderson, J. R., & Bower, G. H. (2014). *Human associative memory*: Psychology press.

Baumeister, R. F., & Vohs, K. D. (2003). Self-regulation and the executive function of the self. *Handbook of self and identity, 1*, 197-217.

Butler, D. L. (2015). Metacognition and self-regulation in learning. *The SAGE Handbook of Learning*, 291-309.

Caldwell, M. A., & Peplau, L. A. (1982). Sex differences in same-sex friendship. *Sex roles, 8* (7), 721-732.

Carver, C. S., & Scheier, M. F. (2014). Dispositional optimism. *Trends in cognitive sciences, 18* (6), 293-299.

Caselli, G., Offredi, A., Martino, F., Varalli, D., Ruggiero, G. M., Sassaroli, S., . . . Wells, A. (2017). Metacognitive beliefs and rumination as predictors of anger: A prospective study. *Aggressive Behavior*. https://doi. org/10.1002/ab.21699

Colombel, F. (2007). Memory bias and depression: a critical commentary. *L'Encephale, 33* (3 Pt 1), 242-248.

Conway, M. A., & Loveday, C. (2015). Remembering, imagining, false memories & personal meanings. *Consciousness and cognition, 33*, 574-581.

Dalgleish, T., & Werner-Seidler, A. (2014). Disruptions in autobiographical memory processing in depression and the emergence of memory therapeutics. *Trends in cognitive sciences, 18* (11), 596-604.

Dardas, L. A., & Ahmad, M. M. (2015). Coping strategies as mediators and moderators between stress and quality of life among parents of children with autistic disorder. *Stress and Health, 31* (1), 5-12.

Endler, N. S., & Parker, J. D. (1994). Assessment of multidimensional coping: Task, emotion, and avoidance strategies. *Psychological Assessment, 6* (1), 50.

Ghosh, V. E., & Gilboa, A. (2014). What is a memory schema? A historical perspective on current neuroscience literature. *Neuropsychologia, 53*, 104-114.

Inzlicht, M., Bartholow, B. D., & Hirsh, J. B. (2015). Emotional foundations of cognitive control. *Trends in Cognitive Sciences, 19* (3), 126-132.

Izard, C. E. (2013). *Human emotions*: Springer Science & Business Media.

Luminet, O., Papageorgiou, C., & Wells, A. (2004). Assessment and measurement of rumination. *Depressive rumination: nature, theory and treatment*, 187-215.

Norton, A. R., & Abbott, M. J. (2016). Self-focused cognition in social anxiety: A review of the theoretical and empirical literature. *Behaviour Change, 33* (1), 44-64.

Papageorgiou, C., & Wells, A. (2001). Metacognitive beliefs about rumination in recurrent major depression. *Cognitive and Behavioral Practice, 8* (2), 160-164.

Robichaud, M., Dugas, M. J., & Conway, M. (2003). Gender differences in worry and associated cognitive-behavioral variables. *Journal of Anxiety Disorders, 17* (5), 501-516.

Vohs, K. D., & Baumeister, R. F. (2016). *Handbook of self-regulation: Research, theory, and applications*: Guilford Publications.

Voigt, B. (2017). Organizing Facets of Self-Regulation: Goals, Process Phases, Obstacles and Mechanisms. *Journal of Self-Regulation and Regulation, 3*, 77-108.

Wells, A., & Cartwright-Hatton, S. (2004). A short form of the metacognitions questionnaire: properties of the MCQ-30. *Behaviour Research And Therapy, 42* (4), 385-396.

Wells, A., & Davies, M. I. (1994). The Thought Control Questionnaire: A measure of individual differences in the control of unwanted thoughts. *Behaviour research And Therapy, 32* (8), 871-878.

Wells, A., & Matthews, G. (1996). Modelling cognition in emotional disorder: The S-REF model. *Behaviour research And Therapy, 34* (11), 881-888.

Willard, A. K., & Norenzayan, A. (2013). Cognitive biases explain religious belief, paranormal belief, and belief in life's purpose. *Cognition, 129* (2), 379-391.

Zweig, J. S. (2015). Are women happier than men? Evidence from the Gallup World Poll. *Journal of Happiness Studies, 16* (2), 515-541.

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Table 1

Gender wise Mean Differences on Main Study Variables (N=514).

	Males (*N*= 369)		Females (*N* = 127)				95% CI		Cohen's
Variables	*M*	*SD*	*M*	*SD*	*t* (494)	*p*	*LL*	*UL*	*d*
PBW	13.32	3.91	13.48	4.09	.38	.71	-.65	.95	.04
EOC	46.51	8.89	49.45	9.26	3.16	.00	1.11	4.78	.32
Worry	12.58	3.74	13.32	4.10	1.88	.05	.03	1.53	18.86
CIT	13.64	3.44	49.45	3.63	1.15	.15	-.19	1.23	10.12
NBRS	26.54	8.19	27.69	8.06	1.36	.18	-.52	2.81	14.15

Note. PBW= Positive Beliefs about Worry; EOC= Emotion Oriented Coping; CIT= Control of Intrusive Thoughts; NBRS= Negative Beliefs about Rumination; *$p < .05$; **$p < .01$.

Table 2

Table showing Direct and Indirect Effects for Gender across Positive Beliefs about Worry (PBW), Control of Intrusive Thoughts (CIT), Emotion Oriented Coping (EOC), Worry and Negative Beliefs about Rumination (NBRS)

			Dependent							
			EOC		CIT		Worry		NBRS	
	Predictors	Gender	*β*	*p*	*β*	*p*	*β*	*p*	*β*	*p*
Direct	PBW	Males	.41	.00	.34	.00	.25	.00		
		Females	.26	.16	.43	.07	.70	.01		
	Worry	Males							.32	.01
		Females							.25	.22
	EOC	Males			.24	.01	.29	.01	.15	.09
		Females			.35	.03	.01	-	.23	.34
	CIT	Males							.31	.01
		Females							.08	.68
Indirect	PBW	Males			.10	.00	.12	.00	.31	.00
		Females			.09	.15	.00	.88	.28	.07
	Worry	Males								
		Females								
	EOC	Males							.17	.00
		Females							.31	.69
	CIT	Males								
		Females								
Total	PBRS	Males	.41	.00	.43	.00	.36	.00	.31	.00
		Females	.26	.16	.53	.02	.71	.01	.28	.07
	Worry	Males							.32	.01
		Females							.25	.22
	EOC	Males			.24	.01	.29	.01	.32	.00
		Females			.35	.03	.01	-	.26	.29
	CIT	Males							.31	.01
		Females							.08	.70

Table 3

Model Fit Indices for Basic Model, with Gender as Moderator and Fully-Constraint Model (N = 514).

	χ^2 (*df*)	CFI	TLI	RMSEA
Model 1	7.19 (2)	9.67	.88	.12
Model 2	.20 (2)	1.00	1.07	.00
Model 3	16.2 (10)	.98	.95	.05

Note: Model 1= Basic Model; Model 2= Model with gender as moderator; Model 3= Fully-Constraint Model

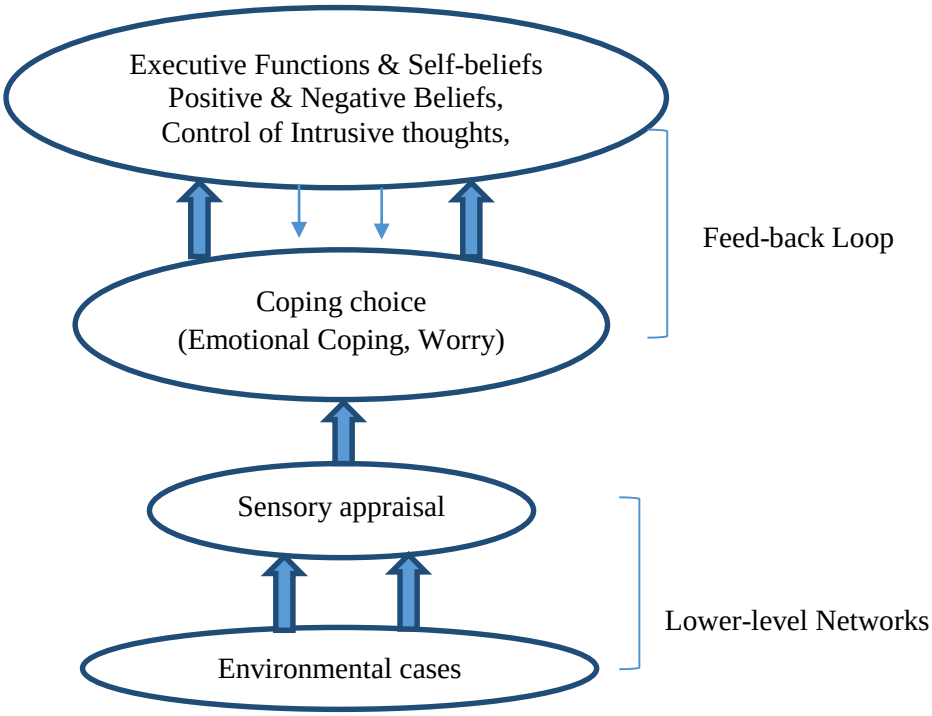

Figure 1: Adapted from S-REF Model applied to Rumination and Depression (Mathews & Wells, 1996)

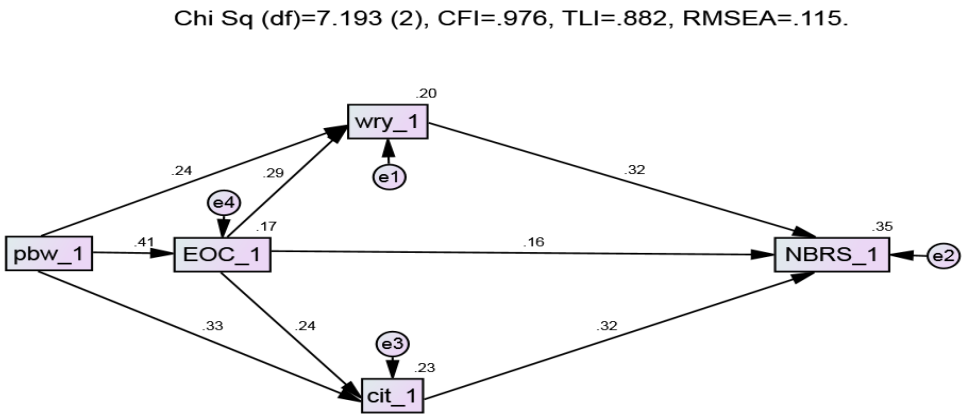

Figure 2. Structural Equation Unconstraint Model without Gender as Moderator (N = 514).

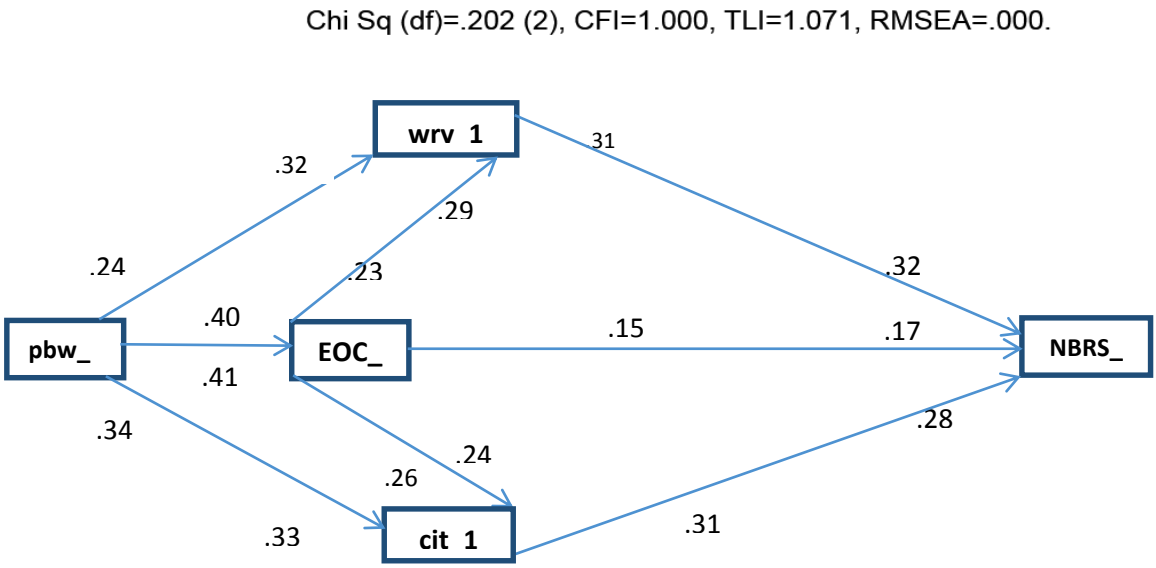

Figure 3. Structural Equation Unconstraint Model with Gender as Moderator, estimates for Males and Females (N = 514).

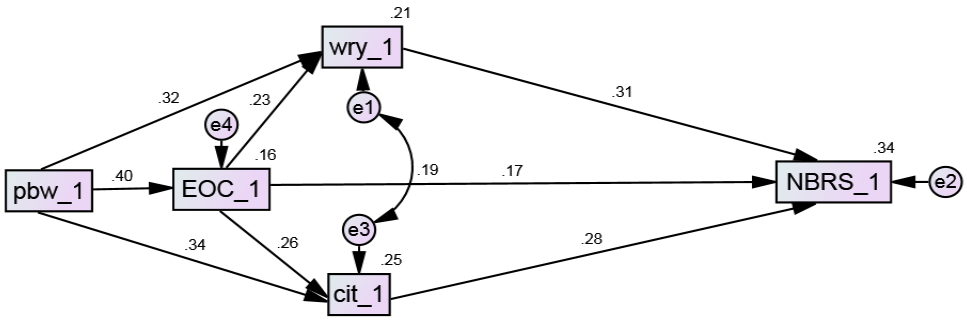

Figure 4. Fully-constraint Model with Gender as Moderator, estimates for Males (N = 514).