

# Relationship Between Perceived Stress and Physical Symptoms with Somatic Symptoms Disorder as a Moderating Variable: Study on Medical Student

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**Abstract**— Human as a living creature has two component; body (soma) and mind/soul (psyche). The reciprocal relationship between them has been studied in philosophy and medical field. A supporting theory states “A disturbance in one component would cause a disturbance to the other”. Example of the possible disturbance is stress (mentally) or physical pain/symptoms (physically). The theory has a similar definition to a specific clinical disorder; somatic symptoms disorder (SSD) that will be used as a moderator. This study aims to know the relationship between perceived stress (PSS) and physical symptoms (PHQ), and in what level would SSD moderate the relation between both variables. The subjects of this research were 152 medical students whom are doing internship. The data gathered were processed using SPSS and analyzed with regression with moderator model. The results shows a significant relationship between PSS and PHQ ( $r^2$  of 0.40,  $p=0.000<0.001$ ). The focal predictor shows the moderator only works only for subjects that are categorized on „low□ in SSD score. Showing up to 0.2533 scores as effect and  $p=0.0001<0.001$ . Linear regression between PSS and PHQ shows an  $r^2 =0.18$ ,  $p=0.000<0.001$ ; indicating that with or without SSD, the relationship between PSS and PHQ remain to have a significant relation.

**Keywords:** *stress, physical symptoms, somatic symptoms disorder, moderator*

## I. INTRODUCTION

Psychology as a discipline strives to explain the gap between mind and body relationship. The development of psychological intervention

focused on the mind (psyche) of the client, while medical sciences focused on the body (soma)[1].

In several clinical cases, there are clients reporting to have physical symptoms with no medical evidence regarding it. The physical symptoms without any form of physical injury are better known as psychosomatic disorder [2] . Psychosomatic derives from two words, psyche (mind) and soma (body). Psychosomatic is a disorder that disrupts both physical and mental aspect of a person [3]. The patient of psychosomatic symptoms has bodily symptoms of psychic, emotional, or mental origin; in which the physical symptoms are caused or exacerbated by psychological factors. The physical symptoms varies for every individual, some examples are headache, lower back pain, or irritable bowel syndrome [4] In DSM-5, this disorder is known as somatic symptoms disorder. The effect of this particular disorder would cause a disturbance in their daily activity. The sufferer would has an exaggerated thoughts, feelings, and response to their somatic condition.

Etiologically, there are various causes of somatic symptoms disorder; with some of them are the patient’s perception and distressing experience. Study reveals that several psychological reason (depression, anxiety, perceived stress) that have a close link to respondents with PUPS (Persistent Unexplained Physical Symptoms)[5]. In transactional theory, stress has a definition suggested by Lazarus as thoughts appraised by an individual on their own level of stress, and not based on the severity or frequency of the stress itself, but rather based on their perception. Any

experience/ event will be appraised by the individual subjectively, if the particular event perceived as threat/ distressing, then a stress will happen.

Model of stress theory signify that the process of stress starts from an event that knock someone off balance.\* That condition would put the person on disequilibrium and an effort must be made to restore the balance. Any kind of event (from temperature changes to a death of a loved one) would require the person to adapt with it. When the person interprets the event as threatening, the stress happens. Emotional reaction will occur in response to the stressor. The emotional response would then drives a physical reaction, such as overventilating, increase in cholesterol, heart rate, muscle tension, ect. When the physical response to the stress becomes chronic/ prolonged, any kind of disorder (physical or mental) would happen. These consequences would also affect performance, interpersonal relationship negatively [6].

However, how someone perceives a situation greatly differs across culture. One stressful event on a culture could be perceived as normal on other. For example, „harsh“ word in Russia would be considered normal, yet in western country (America), the exact same word would cause disturbance to them.

Several studies consistently proof that there are relationship between perceived stress and physical symptoms. But, the cultural aspect that could affect one’s perception regarding stress couldn’t be generalized from one culture to other. The studies aimed to see the effect of stress are predominantly done in western culture such as Germany and UK [7][8][9][10][11]. Study regarding the relationship between perceived stress and physical symptoms is yet to be done, so it would require another perspective regarding relationship between those variables or as in psychosomatic disorder in general.

## II. METHODS

### A. *Participants and procedure*

The data analyzed in this study came from several questionnaires shared online to a specific group of medical students whom are currently doing internship. The online questionnaires were shared around late March to May. The randomly selected samples were 182 medical students currently doing internships that have completed the questionnaires consisting of Patient Health Questionnaire-15 (PHQ-15), Somatic Symptoms Disorder-12 (SSD-12), and Perceived Stress Scale- 10 (PSS- 10).

### B. *Measures*

PSS-10 is a 10-item self-report inventory to measure feeling and thoughts related to stress during the last months. This questionnaire is developed by Cohen, Kamarck, and Mermeister (1983) [13].

It is made up of two dimensions; perceived helplessness/stress and perceived self- efficacy/ coping with the perceived self- efficacy/coping scored by reversing the responses. PSS-10 has a 5-point scale from 0 (never) to 4 (very often). It comprises of items such as “in the last month, how often have you been upset because of something that happened unexpectedly? A higher score indicates a higher level of perceived stress, whilst lower score indicates less stress.

PHQ-15 is a 15-item self-report inventory to measure level of physical symptoms disturbance for the last 4 weeks. This questionnaire is developed by Spitzer, Williams, & Kroenke (2002) PHQ-15 has a 3-point scale from 0 (not bothered at all) to 2 (bothered a lot) [14]. It comprises of list of common physical symptoms such as „headache“ and „stomach pain“. A higher score indicates a higher level of physical symptoms felt by the participant, whilst lower score indicates either none or unbothered by the physical symptoms. SSD-12 is a 12 items self-report questionnaire to support physicians and other health care provides when considering a patient with somatic symptoms disorder. This questionnaire is developed by Toussaint, Murray, Voigt, Herzog, Gierk,

Kroenke, Rief, & Henningsen. (2016) [12]. It is made up of three dimension; cognitive, affective, and behavior; based on the DSM-V criterion of somatic symptoms disorder. SSD-12 has a 5-point scale from 0 (never) to 4 (very often). It comprises of items such as “I think that my physical symptoms are signs of a serious illness”. A higher score indicates a higher possibility of the respondent being diagnosed with somatic symptoms disorder, whilst lower scored proves otherwise.

The gathered data were then to be analyzed with SPSS and process to evaluate the relationship between them using regression with moderator model with PSS-10 (Perceived stress) as the independent variable, PHQ-15 (physical symptoms) as the dependent variable, and SSD-12 (somatic symptoms disorder) as the moderating variable.

**III. RESULTS**

The participants comprised of 33 men (21.7%) and 119 women (78.3%) with mean age of 23.618 ±1.3565. The participant comprised of 94 students (61.8%) studying at Jakarta and 58 students (38.2%) studying outside Jakarta. Also, 59 participants (38.8%) have their internship at Jakarta and 93 students (61.2%) have their internship outside Jakarta.

Table 1: Participant characteristic

Characteristic	Frequency	Percentage
<b>Gender</b>		
• Male	33	21.7
• Female	119	78.3
<b>University Area</b>		
• Jakarta	94	61.8
• Outside Jakarta	58	38.2
<b>Internship Area</b>		
• Jakarta	59	38.8
• Outside Jakarta	93	61.2
<b>Total</b>	<b>152</b>	<b>100</b>

Regression model requires the data spread to be normal. Analyzing with Kolmogorov-Smirnov, it was shown that the data distribution of PHQ-15 isn't normal, thus several samples which identified as outliers were deleted until the data distribution is normal. From, 182 respondents, the data deletion reduce the sample to 152

respondents until the normality test hits the minimum significance above 0.05. SSD-12, while being a part of the regression analysis, being the moderator it doesn't necessarily require to have a normal data distribution.

Table 2: Normality Statistic

Variable	Sig.	Distribution
PSS-10	0.060	Normal
PHQ-15	0.054	Normal
SSD-12	0.000	Not normal

Comparing the hypothetical and empirical mean to each questionnaire, the participants' PHQ-15 and SSD-12 score were placed under the „low“ category (MH= 1, ME= 0.6149, SD=0.28884), (MH=2, ME= 0.7906, SD=0.72762), and PSS-10 score was placed under the „average“ category (MH= 2, ME=1.7757, SD=0.67579).

Table 3: Score Category

Variable	Hypotheti Mean	Empirical	SD	Category
PSS-10	2	1.77	0.67	Average
PHQ-15	1	0.615	0.28	Low
SSD-12	2	0.791	0.72	Low

Correlational analysis using Pearson Correlation shows that all three variables (perceived stress, physical symptoms, somatic symptoms disorder) has a 2-tailed significant correlation (p=0.000<0.01) to each other. PHQ- 15 correlation to PSS-10 with the correlational value of 0.425, p=0.000<0.01. PHQ-15 correlation to SSD-12 with the correlational value of 0.582, p=0.000<0.01. PSS-10 correlation to SSD-12 with the correlational value of 0.469, p=0.000<0.01.

Table 4: Correlational Analysis

Variable		PSS-10	PHQ-15	SSD-12
PSS-10	Pearson Correlation	1	0.425	0.469
	Sig. (2-tailed)		0.000	0.000
PHQ-15	Pearson Correlation	0.425	1	0.582
	Sig. (2-tailed)	0.000		0.000
SSD-12	Pearson Correlation	0.469	0.582	1
	Sig. (2-tailed)	0.000	0.000	

The regression analysis shows that SSD-12 has a significant role being a moderator ( $p= 0.0047 < 0.01$ ). The overall model regression between perceived stress and physical symptoms shows an  $r^2$  of 0.4014 with  $p=0.000 < 0.01$  which indicates the significant relationship between perceived stress and physical symptoms with somatic symptoms disorder being the moderator. Without SSD-12 being a moderator, the linear regression between perceived stress and physical symptoms remain to shows a significant relationship between them ( $r^2= 0.180, p=0.000 < 0.01$ ).

Table 5: Linear Regression

Variable	R2	F	p
PSS-10	0.180	33.0755	0.000

Table 6a: Regression with Moderator: Overall Model

Variable	R2	F	p
PSS-10 □ PHQ-15 with SSD-12	0.4014	33.0755	0.000

Table 6b: Regression with Moderator: Interaction Model

	coeff	t	P
Constant	2.4893	2.2776	0.0242
PSS	0.2533	3.9377	0.0001
SSD	0.5879	4.6983	0.0000
Int 1	-0.0170	-2.8727	0.0047

#### IV. DISCUSSION

In general, the participants of this study indicate a low level of physical symptoms and somatic symptoms disorder. The reason why it has a low score on both variables are because these questionnaires are usually used as an assessment tools for patients that shows a particularly specific symptoms to elaborate any indication of somatic symptoms disorder, while the participant of this study are randomized and usually healthy.

The results of this study is consistent to the previous study [5][6][15] that also shows a relationship between perceived stress and physical symptoms, but on a different population. Before the regression analysis, a correlation analysis was done and shows that each variable has a significant positive correlation to each other. The close positive correlation might one of the reasons why somatic symptoms disorder has a significant effect as a moderator and the significant relationship between perceived stress and physical symptoms.

Without SSD-12 as the moderator, linear regression between PSS-10 and PHQ-15 shows a significant relationship ( $r^2= 0.180, p=0.000 < 0.01$ ); proving that perceived stress has a significant relationship between perceived stress and physical symptoms. With SSD-12 as the moderating variable, PSS-10 and PHQ-15 also shows a significant relationship ( $r^2= 0.4014, p=0.000 < 0.01$ ). The higher  $r^2$  score on the data analysis with a moderating variable indicates that SSD-12 strengthen the relationship between PSS-10 and PHQ-15. The explanation behind this, might be that SSD-12 as the moderating variable specify the PSS-10 questionnaire about the perceived stress towards a more specific problem; the stress itself on their physical health in general.

Johnson-Neyman analysis on moderating effect of SSD-12 was done to show conditional effect and focal predictor of SSD-12. The result shows that people with „low“ level of somatic symptoms disorder (lower than 18.8511) are those whose perceived stress and physical symptoms have significant relationship, while people in „average“ or „high“ category shows no moderating effect the two variables. The reason why SSD-12 remains to have a significant role as a moderator despite only effective to those with „low“ score is because the SSD data is in an extreme positively skewed graph (0.947); indicating most participants scored „low“ on the SSDquestionnaire.

Future studies can further develop this study by taking samples from someone who has already been diagnosed with somatic symptoms disorder to look for moderation effect on higher level of category (PHQ-15 and SSD-12).

## V. CONCLUSION

Result of this study shows that there are relationship between perceived stress and physical symptoms on medical students that are currently doing internship. Somatic symptoms disorder also shows to have a significant role as a moderating variable between the two variables. The regression analysis reveals that with or without somatic symptoms disorder as a moderator, the relationship between perceived stress and physical symptoms

remains to have a significant correlation. However, the regression analysis with somatic symptoms as a moderator shows a higher rate on the  $r^2$  than the linear regression without somatic symptoms disorder This indicate somatic symptoms disorder's role as a moderator strengthen the relationship between perceived stress and physical symptoms.

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