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Parent decision toward measles, mumps, rubella vaccination and its associated factors based on protective motivation theory

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ABSTRACT

Childhood vaccination provides direct protection through community immunity, while also contributing to population-level disease protection. The purpose of this study was to determine parents' decision on measles, mumps, rubela (MMR) vaccination and the factors that influence their decisions. This study used a cross-sectional study in a community setting in Banten, Indonesia. The protection motivation theory (PMT) scale incorporates interpersonal factors, prior experience, MMR information sources, threat appraisal, and coping appraisal. A multivariate logistic regression was utilized to determine the factors related with the parent's decision. A total of 220 people volunteered to participate in this study, of which 45.5% (n=100) accepted the MMR vaccine on time, 22.7% (n=50) accepted it late, and 31.8 % (n=70) received no MMR vaccine at all. Those who accept MMR vaccine on time were more likely to had secondary and below of education level, interpersonal characteristics, treat appraisal, coping appraisal, past experience, and MMR knowledge and sources than those who did not accept MMR vaccine. The present study, which employed Protection Motivation Theory, provided valuable insights into the factors that influence parents' intentions to adhere with the official MMR vaccine advice in a Banten region with a high measles prevalence.

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1. INTRODUCTION

Indonesia was one of ten countries with 60% unprotected children, with around one million children under and unvaccinated [1]. The Indonesian Ministry of Health reported in 2018 that there were 57,056 cases of measles and rubella between 2014 and July 2018. (8,964 for measles and 5,737 for rubella). The measles incidence rate per 100,000 population decreased from 9.2 to 5.6 between 2011 and 2017. However, the incidence rate increased from 3.2 to 5.6 per 100,000 population between 2015 and 2017. Over three-fourths of all measles (89%) and rubella (77%) cases were reported in children under the age of 15. Patients with measles may develop diarrhea, meningitis, and even death as a result of these complications [2]. About 1 in 20 measles patients develops pneumonia, and 1 in 1,000 develops a brain inflammation [3].

Childhood vaccination provides direct protection through community immunity, while also contributing to population-level disease protection [3]. While the majority of people accept vaccination as necessary, it might create anxiety for a variety of religion, safety, or political reasons [4]. Parents are regarded as the most significant individuals who make the final decision regarding their children's vaccination. Individual differences play an important role in the decision to vaccinate against the measles mumps rubela

(MMR) virus [5]. A lot of theories explored these behavioral distinctions from various perspectives. For example, parents who believe in traditional medicine or who are concerned about vaccination side effects may postpone or refuse to vaccinate their children [5]. Parents are thus an essential target demographic for health workers attempting to maintain high immunization coverage rates [6].

Vaccination decision-making motivations and barriers have been extensively researched. The strongest determinants of vaccination behaviors are knowledge of the disease's risks and the vaccine's adverse effects [7], disease and vaccine beliefs and attitudes [8] and their effectiveness [9], and safety concerns [10]. Extensive research has also highlighted the importance of faith in medical personnel, health agencies, and governments [11]–[15]. The background of the pediatrician and the way the child is referred for vaccination (presumptive vs. participatory) may also play a role in the decision. Education [16], age, sex, marital status, and number of children had mixed results [17].

Protective motivation theory (PMT) was first proposed by Rogers [18] to explain how people respond to fear messages in the health domain, but it has since expanded to explain how people respond to a wide range of triggers (for example, environmental concerns and political issues). PMT was been used in over 30,000 studies, providing greater insight into the cognitive mediating process leading to protective motive. The threat appraisal process now includes fear, which is triggered by assessments of the threat's intensity and a person's vulnerability (susceptibility). Fear is an emotional response to a threat, rather than a cognitive response (e.g., reason-based). Threats can range in severity and vulnerability from low to severe. Protective motivation increased during the coping assessment procedure when participants believed in the reaction's efficacy and self-efficacy in implementing it. To counteract this, protective motivation has been found to be reduced by reaction cost. In situations where the threat appraisal outweighs the coping solution, people are more inclined to engage in maladaptive reactions like nonaction or just ignoring it. The adaptive reaction was allowed as long as the coping assessment outweighed the danger appraisal. Numerous researches have demonstrated the importance of perceived self-efficacy and belief in the response's efficacy in promoting protective motivation [19]. Most PMT applications only include the important effects of severity, vulnerability, reaction efficacy, self-efficacy, and response costs. The conceptual distinction between the reward value of a risk behavior and the cost of a preventative technique may be unclear. Despite the fact that PMT has been studied a lot, there are still parts of PMT that need more research and specificity. Thus, this study aimed to determine parent decision toward MMR vaccination and its associated factors in Indonesia.

2. RESEARCH METHOD

2.1. Design and sample

This study conducted using cross-sectional study at community setting located Banten, Indonesia. Parents were eligible to participate if they had a child between the ages of 11 months and 3.5 years (a broad age range for MMR, although it is recommended that the vaccine be given at 15–18 months of age) and were MMR eligible (i.e., had no confirmed contraindications). The sample size was determined using G-Power Software Version 3.1.6 with the assumption that=0.05, effect size=0.15, power level=0.95, and number of predictors=11. A convenience sampling technique was utilized to choose a participant.

2.2. Instrument

Demographic data includes age, gender (male and female), education, ethnicity, religion, current status of work or employment, and average monthly income. Parent decision against MMR was measured with a single item (“I follow official re- commendations regarding MMR vaccination” if yes, whether on time as recommended or delay receiving MMR vaccination [20]. If “No”, we counted as against MMR vaccine. PMT is a measure developed by Camerini *et al.* [20] that takes into account aspects of interpersonal characteristics, prior experience, MMR information sources, threat appraisal, and coping appraisal. There are a total of 18 items on the Likert scale (with 1 indicating strong disagreement and 4 indicating strong agreement). The content validity index (CVI) was 0.90-1.00. Following an examination of the items (n=18), the Scale- Content validity index (S-CVI) for clarity was 0.99, and the S-CVI for understanding was 0.98, The confirmatory factor analysis showed that the model with five linked components has good fit indices (CFI=0.99; TLI=0.99; RMSEA=0.077 [90% CI 0.069-0.085]. Cronbach's alphas were more significant than 0.70 for all sub-scales.

2.3. Procedure

Researchers approached nurse or nurses or the head of the public health center after getting ethical clearance from an international review board registered with the Ministry of Health. Next, describe the details about this research, including the purpose, the procedures, and the protections in place to protect the participants. Researchers notify parents of inclusion and exclusion criteria, then ask for data from possible participants. The researcher then tried to get in touch with the people who took part in the study, both by phone

and by going to their homes. The subject was then given a questionnaire to complete and asked to return in at least three days.

2.4. Data analysis

A non-significant test, the Kolmogorov Smirnov test, was used to determine the normality of the data prior to bivariate analysis. The results of Kolmogorov Smirnov test showed that interpersonal characteristics, past experience, MMR information sources, threat appraisal, and coping appraisal were normally distributed ($p>0.05$). A descriptive statistic that is applied to continuous data using the mean and standard deviation and to categorical data using the frequency. The participants were then divided into three groups: those who accepted MMR on time, those who accepted MMR late, and those who did not accept MMR. The correlation between demographic characteristics and decision toward MMR was employed chi-square tests for nominal/categorical data and ANOVA for continuous data. Then, bivariate analysis to examine the correlation between PMT construct with parent decision toward MMR was used ANOVA. A multivariate logistic regression was performed to determine parent decision factors (accept vaccination on time, accept vaccination late, and no vacciantion). All data were analyzed using SPSS v 23.0 (SPSS Inc. Chicago, IL).

3. RESULTS

The total of 220 participants agreed to join in this study, 45.5% (n=100) accept MMR vaccine on time, 22.7% (n=50) accept MMR vaccine late, and 31.8% (n=70) obtain no MMR vaccine. Table 1 shows sociodemographic characteristics of studied respondent. The majority of parent were male, had above secondary level of education, employed with monthly income above minimum regional salary, and Muslim. There we significance differences between those who accept MMR on time, accept MMR late, and obtain no MMR in term of sex, education level, working status, and monthly income ($p<0.05$).

Table 1. Correlation between sociodemographic characteristics with parent decision toward MMR vaccine (n=220)

Variable	Accept MMR vaccine on time n=100 (%)	Accept MMR vaccine late n=50 (%)	Obtain no MMR vaccine n=70 (%)	p-value
Sex				
Female	58 (58)	14 (28)	23 (32.9)	0.035
Male	42 (42)	36 (72)	47 (67.1)	
Age (years old), Mean±SD	35.12±10.45	34.12±11.67	35.34±9.21	0.121
Educational level				
Secondary and below	62 (62)	21 (42)	17 (24.3)	0.001
Above secondary level	38 (38)	29 (58)	53 (75.7)	
Working status				
Employed	74 (74)	12 (24)	51 (72.9)	0.001
Unemployed	26 (26)	38 (76)	19 (27.1)	
Monthly income				
Below minimum regional salary	31 (31)	15 (30)	21 (30)	0.145
Above minimum regional salary	69 (69)	35 (75)	49 (70)	
Religion				
Muslim	92 (92)	39 (78)	63 (90)	0.437
Non-Muslim	8 (8)	11 (22)	7 (10)	

Table 2 shows descriptive statistics of protective motivation theory constructs. The highest mean score was MMR knowledge (3.32±1.78), followed by interpersonal characteristic (3.20±1.54), past experience (3.11±1.32), coping appraisal (3.00±1.34), and threat appraisal (2.89±1.10). The correlation between PMT construct with parent decision toward MMR vaccine. Interpersonal characteristics, treat appraisal, coping appraisal, past experience, and MMR knowledge and sources was significantly different with those who accept MMR vaccine on time, accept MMR vaccine late, and obtain no MMR ($p<0.05$).

Table 3 shows determinant of parent decision toward MMR vaccine. Those who accept MMR vaccine on time were more likely to had secondary and below of education level (OR=1.81, 95% CI=1.02–3.65), interpersonal characteristics (OR=1.14;95% CI=1.03–3.03), treat appraisal (OR=0.88, 95% CI=0.46–0.97), coping appraisal (OR=0.82, 95% CI=0.63–0.90), past experience (OR=0.75, 95% CI=0.64–0.88), and MMR.

Table 2. Correlation between PMT construct with parent decision toward MMR

Variable	Total	Accept MMR vaccine on time	Accept MMR vaccine late	Obtain no MMR vaccine	p-value
	n=220	n=100	n=50	n=70	
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	
Interpersonal characteristic	3.20±1.54	3.1±0.3	2.9±1.3	2.4±1.1	0.032
Threat appraisal	2.89±1.10	3.2±1.2	3.1±1.9	2.3±1.9	0.001
Coping appraisal	3.00±1.34	3.1±1.1	3.0±1.8	2.0±1.0	0.001
Past experience	3.11±1.32	3.4±6.8	3.3±1.5	2.3±1.6	0.001
MMR information source	3.32±1.78	2.6±1.9	2.9±1.0	3.4±1.3	0.001

Table 3. Determinant of parent decision toward MMR vaccine

Variable	Univariate analysis		Multivariate analysis	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Social-demographic characteristics				
Sex		0.387		0.178
Male	0.88 (0.41–2.18)		0.91 (0.68–2.13)	
Female	1		1	
Age (years old), Mean ± SD	0.75 (0.31–0.93)	0.003	1.23 (0.52–1.16)	0.276
Educational level		0.001		0.002
Secondary and below	1.81 (1.02–3.65)		1.65 (1.11–3.93)	
Above secondary level	1		1	
Working status		0.219		0.368
Employed	0.65 (0.31–1.38)		0.74 (0.46–1.19)	
Unemployed	1		1	
Monthly income		0.329		0.192
Above minimum regional salary	1.16 (0.89–1.50)		1.08 (0.70–1.67)	
Below minimum regional salary	1		1	
Religion		0.546		0.625
Muslim	0.81 (0.71–1.82)		0.76 (0.74–1.95)	
Non-Muslim	1		1	
Protective motivation constructs				
Interpersonal characteristic	1.14 (1.03–3.03)	0.001	1.03 (1.00–2.89)	0.001
Threat appraisal	0.88 (0.46–0.97)	0.001	0.79 (0.51–0.93)	0.001
Coping appraisal	0.82 (0.63–0.90)	0.001	0.64 (0.44–0.81)	0.001
Past experience	0.75 (0.64–0.88)	0.001	0.76 (0.55–0.89)	0.001
MMR information source	0.85 (0.70–0.90)	0.001	0.62 (0.51–0.83)	0.001

4. DISCUSSION

This study used the PMT to assess whether parents vaccinated their children with the MMR vaccine. Other research has shown that not all PMT traits predict behavior equally well, and this one is no exception. One study found that coping appraisal concepts were more closely associated to adaptive action or linked intention than threat appraisal concepts. Vaccination decisions are often impacted by other parents' views [21], [22]. The true level of scientific consensus on immunization and vaccination is divided by the low level of public acceptance [23]. Concern for social standards and values, as well as metacognitive judgments of other groups (e.g., medical experts), influences trust in immunizations and vaccine decisions [22], [24]. Normative data is more reliable, less dismissible, and more prominent than anecdotic data [25], [26]. Previous MMR vaccination experience is accounted for by explicitly correlating parents' earlier decision to vaccinate their child against MMR, which has been supported by previous studies [27], [28]. Having a child with measles significantly reduced one's judgment of response effectiveness. Children who had measles after getting two doses of the MMR vaccine likely represent the 3% of cases in which the vaccine fails to protect against measles infection [29]. As a result, many parents doubt the efficacy of the MMR vaccine and will not follow the recommended MMR immunization schedule in the future. Highlighting the MMR vaccine's high efficacy (97% protection with two doses) should help promote vaccination in areas where measles has been reported despite vaccination [29].

Vaccination decisions are influenced by the sources of information people use to learn about vaccination. This is especially true when the sources are credible sources like doctors [5], [30]–[32]. Intriguingly, a recent meta-analysis stressed the importance of information source and information type for immunization outcomes, revealing that lack of knowledge or inadequate advice from general or other health practitioners reduces vaccination acceptability [33]. Our findings support past research that emphasizes the usefulness of MMR vaccinations, and doctors and other healthcare providers must stress the relevance of measles for children's health. Because of the significant media coverage of measles and vaccination, parents are not only actively seeking out but also passively exposed to opposing viewpoints on the significance of

measles and MMR vaccination side effects. Messages that enhance perceived danger are less successful than ones that improve perceived efficacy [34]. However, if parents believe their child is at risk of sickness if not vaccinated, they are more likely to vaccinate or choose to vaccinate [35], [36]. As a result, if someone believes they are in danger of major health problems, their dread increases, as does their desire to protect themselves. Like severity and vulnerability, there may be intrinsic (such as pleasure) and extrinsic (such as social acceptability) rewards that lead to maladaptive behavior.

Our findings should be viewed with care due to many limitations. First, participation in the study was fully voluntary, and parents were invited. This study's participants are likely to be parents who value their local public health organizations' immunization information and actions. To avoid selection bias, future research on this topic should use a more unbiased recruiting method. They didn't even look up MMR vaccine information online. A discriminatory systematic bias (e.g., social desirability bias) could not be avoided, and participants' evaluations of the efficacy of the MMR vaccine response differed greatly. Our sample is typical of the entire Indonesian population in the relevant age range; thus, we may deduce good demographic trends. Our findings may not be applicable to other socio-cultural environments due to Indonesian's unique characteristics. Thus, more research is needed to determine how the PMT's many principles may predict whether or not people will comply with vaccination recommendations and eventually elect to get vaccinated in a variety of socio-cultural contexts.

5. CONCLUSION

In conclusion, those who received MMR vaccines on time were more likely to have a secondary or lower level of education, interpersonal characteristics, treat appraisal, coping appraisal, prior experience, and MMR knowledge and sources than those who did not receive MMR vaccines on time. Using Protection Motivation Theory, this study revealed factors that influence parents' intention to follow official MMR vaccination recommendations in a high measles incidence Banten. Furthermore, research on MMR vaccination should compare parents of very young children, who are the primary target group of MMR vaccination campaigns and interventions, with parents of adolescent children.

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