Factors Explaining Respiratory Infection Prevention Behavior Among Late School-Age Children in Public Schools: A Cross-Sectional Study

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Abstract: Respiratory infections are a significant cause of morbidity among school-age children. Despite public health efforts, the practice of preventive behaviors, such as handwashing and mask-wearing, remains suboptimal in this age group. This cross-sectional study was conducted in Thailand, where respiratory infections remain a public health concern and the practice of sustained preventive behaviors continues to pose ongoing challenges. The Theory of Reasoned Action posits that behavioral intention, shaped by attitudes and subjective norms, is the most proximal determinant of preventive behavior. The study aimed to examine the extent to which demographic variables, attitudes, subjective norms, and behavioral intention explain respiratory infection prevention behaviors among late school-age children. The participants were 211 late school-age children from public primary schools. Data were collected using a structured questionnaire comprising six parts: Demographics, Knowledge, Attitude, Subjective Norms, Behavioral Intention, and Preventive Behavior. Hierarchical regression was performed.

Results revealed that personal characteristics, including gender, age, grade point average, school absenteeism, knowledge, attitude, subjective norms, and behavioral intention, explained 49.9% of the variance in preventive behavior. Behavioral intention emerged as the strongest predictor. Nurses should focus on strengthening intention through attitudes by enhancing educational content that highlights the benefits of respiratory preventive behaviors, and through subjective norms by engaging key influencers such as parents, peer groups, or teachers to promote continuous and sustainable behavior change. However, this intervention should be tested for effectiveness before it can be used in practice.

Keywords: Health behavior, Infection control, Respiratory infection prevention, School-age children, Theory of Reasoned Action

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Introduction

Respiratory infections continue to be a major global health challenge, particularly among school children. Late school-age children, typically aged 10-12 years, represent a particularly vulnerable group due to their frequent close interactions in school settings and the developmental factors that influence their hygiene practices. Worldwide, respiratory illnesses such as the flu, common cold, and COVID-19 have reported prevalence rates among school-age populations ranging from approximately 46% to over 60%.[4] In Thailand, the prevalence of influenza among late

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school-age children increased significantly from 8,009 cases (195.33 per 100,000) in 2014 to 47,894 cases (1,204.02 per 100,000) in 2019. Although prevalence decreased notably during 2020-2021,[25] likely due to intensified hygiene measures during the COVID-19 pandemic, recent data from the first half of 2025 indicate that prevalence remains high at 998.29 per 100,000, ranking third among all age groups. Thus, sustained preventive behaviors remain essential to address ongoing risks.[20]

Efforts to address respiratory infections among late school-age children have primarily focused on promoting preventive behaviors, such as regular hand hygiene, consistent mask-wearing, proper respiratory etiquette, avoiding the shared use of personal items, and maintaining physical distancing. Community health nurses have played a vital role in promoting respiratory infection prevention behaviors among late school-age children by providing health education, modeling hygiene practices, and fostering collaboration with schools and families.[21] Despite these interventions and widespread awareness campaigns, actual adherence to recommended preventive behaviors remains consistently suboptimal in this age group.[8,12,16,19,26,35] This insufficient adherence contributes to the spread of acute respiratory infections, which remain the leading causes of morbidity among children and significantly contribute to healthcare visits, school absenteeism, and poor academic performance.[5,29] Therefore, a more comprehensive understanding of behavioral determinants is necessary to promote preventive practices among this population effectively.

Conceptual Framework and Literature Review

The theoretical framework underpinning this study was the Theory of Reasoned Action (TRA), a well-established theoretical framework for examining determinants of health-related behaviors. TRA explicitly highlights attitude and subjective norms as critical predictors of behavioral intention, which, in turn, directly influence behavior.[2] This theoretical clarity makes TRA particularly suitable for investigating respiratory infection preventive behaviors, as these behaviors are often influenced by both individual beliefs about their effectiveness (attitude) and perceived social norms pressures from significant others such as parents, friends, and teachers (subjective norms). However, existing literature applying TRA to respiratory infection prevention among school-age children is scarce, emphasizing the need for more rigorous, theory-based studies in this specific context.

Late school-age children (aged 10-12) are in a developmental transition from perceptual to conceptual thinking,[27] which enhances their cognitive ability to understand cause-and-effect relationships in health, problem-solving, and independent decision -making.[27,28] At this age, children begin to develop a greater capacity to comprehend the importance of preventing respiratory infections. However, psychosocial factors such as attitudes, subjective norms, and behavioral intention continue to play a critical role in shaping actual behaviors.[2] Therefore, studying the determinants of respiratory infection prevention behaviors in this age group is essential. Such insights can support teachers, who interact with students on a daily basis, in shaping psychosocial factors through role modeling, social norms, and reinforcement of preventive behaviors. They can also guide community health nurses and school nurses in designing developmentally appropriate health promotion strategies that align with the cognitive and psychosocial needs of late school-age children.

Demographic variables (e.g., age, gender, and academic achievement) are crucial for understanding the distribution and patterns of respiratory infections within specific populations.[1] Preventive behaviors also vary considerably by age. Children aged 12-13 generally demonstrate increased understanding and more

consistent application of preventive measures. However, discomfort with practices such as prolonged mask-wearing may counteract adherence.[6] Age is also a significant risk factor in the development of acute respiratory infections, with younger children being more vulnerable due to their immature immune systems and lower awareness of hygiene practices.[13] Gender is another significant demographic factor influencing both infection susceptibility and preventive behavior. Analyzing gender distribution within acute respiratory infection cases is crucial for informing targeted healthcare strategies and resource allocation, ensuring that interventions are appropriately tailored to meet the specific needs of different demographic groups and address potential disparities in access to care and treatment outcomes. Girls consistently demonstrate more favorable attitudes toward higher perceived usefulness of preventive behaviors, such as mask-wearing, than boys.[18,22] This trend suggests that gender is a significant predictor of behavioral intention and practice in infection prevention. In the Ciao Corona study, 61% of girls perceived masks as useful at school compared to 53% of boys.[6] This perception translated into higher reported adherence among girls.

Knowledge about respiratory infections, including understanding transmission routes, preventive measures, and symptoms, is considered an essential factor influencing preventive behaviors in school-age children. Current evidence consistently demonstrates a positive association between children's knowledge levels and their actual preventive practices, such as proper hand hygiene, mask usage, and social distancing.[4] Studies indicate that children who possess accurate and adequate knowledge about respiratory infections tend to exhibit more consistent preventive behaviors. Recent research conducted in school settings highlights that improving children's knowledge through structured educational interventions significantly enhances their compliance with recommended preventive behaviors.[5] However, while knowledge is an essential prerequisite, this alone may not be sufficient to drive consistent preventive actions. While TRA emphasizes the pathway from attitudes and subjective norms to intention and behavior, empirical studies in school settings show a gap between students' knowledge of preventive behaviors and their actual day-to-day practices. For instance, although regular hand hygiene (washing hands before meals and after using the restroom) and mask-wearing are widely recognized as effective measures, adherence among students remains inconsistent. According to studies by Albishi et al.[4] and Prapamontol et al.,[29] a substantial proportion of students reported inconsistent or inadequate frequency of these preventive practices, despite having adequate awareness. Specifically, practices such as covering the mouth and nose when coughing or sneezing, and not sharing personal items (e.g., drinking glasses, straws, towels), although commonly taught in schools, have shown limited adherence, which significantly increases the risk of infection transmission.[5] Moreover, environmental behaviors such as avoiding crowded places or maintaining physical distance from symptomatic individuals are often less consistently practiced by children, which further contributes to elevated infection risks.[29] Similarly, students' practices of avoiding environmental hazards, like exposure to air pollution or cigarette smoke, which can compromise respiratory health and increase susceptibility to infection, have also remained suboptimal.[5] The persistence of these suboptimal behaviors suggests a critical gap in translating knowledge and behavioral intention into effective, consistent actions among school-age children.[9,38] Importantly, there are limited empirical studies that comprehensively evaluate how knowledge interacts with other psychosocial factors, such as attitudes, subjective norms, and behavioral intentions, in influencing preventive behaviors specifically among late school-age children. Most research in this area has predominantly focused on knowledge alone without integrating broader theoretical frameworks such as the Theory of Reasoned Action (TRA). Addressing this gap by examining knowledge

within a robust theoretical model can enhance understanding of its relative contribution and how it complements other psychosocial determinants of preventive behaviors.

Attitudes toward respiratory infection prevention describe how a person generally perceives a behavior as favorable or unfavorable for engaging in behaviors that aim to reduce the risk of contracting respiratory infections. Attitudes reflect the extent to which a person believes that taking preventive actions, such as handwashing often, covering the mouth and nose during coughs or sneezes, and keeping away from people showing signs of illness, is beneficial and desirable. While knowledge and awareness are necessary precursors to behavioral change, they are not always sufficient to drive the adoption of preventive practices.[34] Individuals may possess a high level of knowledge regarding the transmission and prevention of respiratory infections, but still fail to consistently engage in preventive behaviors due to various psychological, social, and environmental barriers. The more strongly individuals believe that these preventive measures are effective and aligned with their values, the more likely they are to adopt and maintain these behaviors.

Subjective norms refer to the perceived social pressure to engage in or refrain from a behavior. This pressure arises from both injunctive beliefs, which involve whether significant others, such as family members, friends, peers, and healthcare providers, approve or disapprove of the behavior, and descriptive beliefs, which concern whether these individuals themselves engage in the behavior. These beliefs, along with the perceived importance of those referents, contribute to the overall subjective norm.[3] Subjective norms can play a crucial role in shaping health behaviors, particularly in collectivistic societies where individuals are highly influenced by the opinions and expectations of their social networks.[17] For example, observing others wearing face masks can increase the likelihood that an individual will adopt the same behavior.[31] Conversely, if peers or family members discourage preventive behaviors, individuals may be less likely to engage in them, even if they believe in their effectiveness. The reactions from the community either encourage or discourage practices, reflecting whether the program is accepted or not.[14]

Behavioral intention denotes the mental state that indicates how likely an individual is to act in a specific way. It reflects the degree to which a person is consciously planning or motivated to engage in a specific action, such as adhering to preventive measures against respiratory infections.[7] Behavioral intention serves as a proximal determinant of actual behavior, mediating the relationship between attitudes, subjective norms, perceived behavioral control, and the ultimate performance of the behavior.[32] A person's intention to perform a behavior is influenced by their attitude toward the behavior, subjective norms, and perceived behavioral control.[7] Generally, the stronger a person's intention to perform a behavior, the more likely he or she is to carry out the behavior when possible.[37]

Although existing research provides strong evidence supporting these relationships, there is still a lack of empirical data specifically examining the simultaneous influence of attitudes, subjective norms, and intentions among late school-age children. Most studies have focused on younger children, adolescents, or general populations, leaving a significant gap in research concerning the targeted age group. Given the high prevalence and vulnerability of this age group to respiratory infections, deeper insights into how these psychosocial factors collectively influence preventive behaviors are urgently needed.

Study Aims and Hypotheses

This study aimed to 1) examine the effect of demographic factors on respiratory infection prevention behaviors among late school-age children; 2) assess the contribution of attitudes and subjective norms in predicting preventive behaviors after controlling for

demographics, and 3) determine the additional predictive power of behavioral intention beyond demographics, attitudes, and subjective norms. It was hypothesized that: 1) Demographic factors would significantly predict respiratory infection prevention behaviors among late school-age children; 2) Attitudes and subjective norms would significantly predict preventive behaviors after adjusting for demographic variables, and 3) Behavioral intention would significantly improve the prediction of preventive behaviors over and above the effects of demographics, attitudes, and subjective norms.

Methods

Study Design: This study employed a cross-sectional predictive design guided by the Theory of Reasoned Action (TRA) to examine the factors explaining respiratory infection prevention behaviors among late school-age children. The STROBE checklist was used to guide this report.

Participants: The target population consisted of late school-age children enrolled in public primary schools in Chiang Mai Province, in the northern part of Thailand. Two public schools were purposively selected as they had the highest student density in each class, which increases the likelihood of respiratory infection transmission.[33] The total population included 1,444 students aged 10-12 years. G*Power version 3.1 was employed to determine the required sample size, based on an effect size of 0.23, a significance level of 0.05, and a statistical power of 90%.[15] This calculation yielded a sample size of 191 students. To account for incomplete questionnaires, the sample size was increased by 10%, resulting in a total of 211 students.

The sample was proportionally allocated based on the number of late school-aged children in each school. One school had 897 students, and the other had 547, resulting in a ratio of 1.5:1 (127:84 students). Stratified random sampling by age was used to select students from each school, followed by proportional allocation within each classroom.

The inclusion criteria were students aged 10-12 years who were currently enrolled in primary school, could read and write, and had no health issues or chronic illnesses that would impede their ability to complete the questionnaire. The exclusion criteria were students who were unable to participate in the research activities within the specified timeframe. A total of 211 students were recruited for this study.

Ethical Considerations: Ethical approval for this study was granted by the Research Ethics Committee of the Faculty of Nursing, Chiang Mai University, Thailand (2566-FULL010). Before participation, written informed consent was obtained from the parents or legal guardians of all child participants. Additionally, each child participant provided written assent before participation. No personal identifiers were used in the anonymous data collection process. The children's parents or legal guardians provided written, informed consent prior to the children's enrollment in the study. Participants were informed that their involvement was voluntary and that they could withdraw from participation at any time, with no adverse consequences.

Instruments: All research instruments were developed by researchers based on a review of the literature. All instruments were submitted to six experts for validation, including two nursing lecturers specializing in infection control nursing, one nursing lecturer specializing in health behavior, two infection control nurses, and one school health nurse. The instruments were pilot-tested with 30 late school-age children to assess reliability using Cronbach's alpha and KR-20 for dichotomous items.

The Personal Information Questionnaire: A questionnaire collecting demographic data. The questions are a mix of closed-ended and open-ended types. The content validity index (CVI) of the questionnaire was 0.92.

The Knowledge About Respiratory Infections Questionnaire: This instrument consists of 10 true/false questions regarding respiratory infections, with both positively and negatively framed items. Each correct answer receives 1 point, and incorrect answers receive 0 points. An example of an item includes: "Covering your mouth and nose when you cough, or sneeze can help prevent the spread of germs." Scores range from 0 to 10, with higher scores indicating a greater level of knowledge about respiratory infections. The content validity index (CVI) of the questionnaire was 0.97. In the pilot study, the KR-20 coefficient was 0.81, and in the actual study, it was 0.41, indicating low internal consistency.

The Attitude Toward Respiratory Infection Prevention Behavior Questionnaire: This instrument consists of eight positively framed questions on a 5-point Likert scale, assessing the children's attitudes toward respiratory infection prevention behaviors. The scoring criteria are as follows: strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, and strongly agree = 5. An example item is "Wearing a face mask helps prevent respiratory infections and reduces the transmission of infection to others." The scores range from 8 to 40, with higher scores indicating a more positive attitude toward preventing respiratory infections. The content validity index (CVI) of the questionnaire was 0.98. Cronbach's alpha coefficient from the pilot study was 0.84, and in the actual study, it decreased to 0.67, which is considered acceptable but indicates a moderate reduction in internal consistency.

The Subjective Norms Regarding Respiratory Infection Prevention Behavior Questionnaire: This instrument consists of eight positively framed questions on a 5-point Likert scale, assessing the influence of parents and teachers on the children's behavior. The scoring criteria are as follows: strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, and strongly agree = 5. An example item is, "My parents expect me to wear a mask when I have a cough or runny nose." The scores range from 8 to 40, with higher scores indicating a stronger belief that significant others would approve of their engagement in respiratory infection prevention. The content validity index (CVI) of the questionnaire was 0.93. Cronbach's alpha coefficient from the pilot study was 0.84, and in the actual study, it was 0.81.

The Behavioral Intention to Prevent Respiratory Infection Questionnaire: This instrument consists of seven positively framed questions on a 5-point Likert scale, assessing children's intention to prevent respiratory infections. The scoring criteria are as follows: very low intention =1, low intention = 2, moderate intention = 3, high intention = 4, and very high intention = 5. An example item is, "I intend to wash my hands regularly to prevent respiratory infections." The scores range from 7 to 35, with higher scores indicating a stronger intention to prevent respiratory infection. The content validity index (CVI) of the questionnaire was 0.88. Cronbach's alpha coefficient from the pilot study was 0.82, and in the actual study, it was 0.74.

The Respiratory Infection Prevention Behavior Questionnaire: This instrument consists of seven positively framed questions on a 4-point Likert scale, assessing the children's actual prevention behaviors. The scoring criteria are as follows: never = 1, sometimes = 2, often = 3, and always = 4. An example item is, "I wash my hands with soap and water after coughing or sneezing." The scores range from 7 to 28, with higher scores indicating a higher frequency of respiratory infection prevention behaviors. The content validity index (CVI) of the questionnaire was 0.88. Cronbach's alpha coefficient from the pilot study was 0.83, and in the actual study, it was 0.51, which is relatively low internal consistency.

Data Collection: The study was conducted after receiving approval from the Institutional Review Board (IRB) Committee. Participants were recruited, and data were collected from April to June 2024. Data collection began immediately after recruitment. Participants answered the questionnaire step by step under the

guidance of trained research assistants who were familiar with the questionnaire. Participants were allowed to ask questions at any time. The primary investigator (PI) coordinated with relevant parties, including school health teachers and homeroom teachers, to clarify the research objectives, methodology, duration, and anticipated benefits. Coordination with the homeroom teachers was also carried out to identify students who met the eligibility criteria for sample selection. The PI then conducted a lottery to select the sample group and sought cooperation in collecting data from the sample group and their parents. Coordination was facilitated through the homeroom teachers, who distributed consent forms to the parents along with the sample group for consideration at home. When parents came to pick up their children, the forms were returned to the homeroom teachers. The documents explained the importance, benefits, confidentiality, and other relevant details. If parents have any questions, they can contact us immediately for further inquiries about the research study.

After obtaining consent for the research, the PI appointed the classroom teacher as the coordinator to arrange the sample group and prepare research assistants by explaining the objectives, limitations, and detailed use of the questionnaire. The researcher administered the questionnaire. Participants required approximately 30 minutes to finish the initial questionnaire. The sample group was arranged through the homeroom teachers, with approximately 30–40 participants at a time, using the school's meeting room for the questionnaire. Additionally, the research assistants prepared food and snacks as compensation for the participants' time. Then the PI read the questions of the questionnaire and had the sample group complete the questionnaire together, one question at a time. They waited until everyone in the sample group had finished before reading the next question. During this time, the sample group could raise their hands to ask any questions they had, and explanations were provided to everyone at once. There was also a review process after all questionnaires were submitted to prevent incomplete responses. When the sample group completed the questionnaire and returned it to the PI and research assistants, the questionnaires were checked for completeness. The data collection took three months.

Data Analysis: Data were analyzed using SPSS Version 13. Descriptive statistics were used to summarize demographic characteristics and key variables. Hierarchical multiple regression was conducted in three steps: Step 1: Entered demographic variables (gender, age, grade point average, absenteeism, and knowledge); Step 2: Added psychosocial predictors (attitude and subjective norms); and Step 3: Entered behavioral intention. Assumptions of normality, multicollinearity, and independence were tested. Variance inflation factor (VIF) values (1.006 to 1.619) and tolerance values (0.618 to 0.994), in which VIF values below 10 and tolerance levels above 0.10 demonstrate no signs of multicollinearity.[10] The final model yielded a Durbin–Watson value of 1.815, within the acceptable range (1.50 to 2.50),[10] confirming independence of residuals. All data were complete with no missing values.

Results

Demographic characteristics

A total of 211 late school-aged children participated in the study. The majority were female (54.03%), and most were 11 years old (45.02%). The overall mean grade point average (GPA) among participants was 3.50 (SD = 0.41). Regarding school absenteeism, 112 students (53.08%) reported having missed school due to respiratory illnesses, with the common cold being the most frequently cited reason (83.04%). In terms of receiving information related to respiratory infection prevention, 171 students (81.04%) reported having received such information. The primary sources of information included guardians (69.60%), doctors or nurses (56.73%), and TikTok (49.12%), respectively (see **Table 1**).

Table 1. Demographic characteristics, absenteeism, and sources of information on respiratory infection prevention among late school-age children (N = 211)

Variable	Frequency (n = 211)	Percentage (%)
Gender		
Female	114	54.03
Male	97	45.97
Age (years)		
10	70	33.18
11	95	45.02
12	46	21.80
Grade point average*		
Mean = 3.50, SD = 0.41		
Absenteeism due to respiratory illness*		
Ever absent (any reason)	112	53.08
- Common cold	93	83.04
- Influenza	62	55.36
- High fever	53	47.32
No	99	46.92
Received information on respiratory infection prevention**		
Yes	171	81.04
Source - Guardian	119	69.60
- Doctor/Nurse	97	56.73
- TikTok App.	84	49.12
- Teacher	83	48.54
- YouTube	59	34.50
- Facebook	54	31.58
- Instagram	27	15.79
- LINE	14	8.19
- Other (Twitter)	7	4.09
- Celebrity/Singer	6	3.51
	6	3.51
No	40	18.96

Note. *Grade point average is measured on a 4.00-point scale. **Multiple responses are allowed for absenteeism and information source questions.

The mean attitude score was 30.84 (SD = 3.94), while the mean score for subjective norms was 32.56 (SD = 4.51). The mean behavioral intention score was 26.24 (SD = 4.68), and the mean behavior score was 20.01 (SD = 3.60). Regarding knowledge about respiratory infections, the mean score was 7.95 (SD = 1.50).

Correlations among all variables

As shown in **Table 2**, the behavior score showed a strong positive correlation with behavioral

intention (r = 0.684, p < 0.001), followed by attitude (r = 0.384, p < 0.01) and subjective norms (r = 0.379, p < 0.01), supporting the Theory of Reasoned Action. A weak but statistically significant correlation was also found with knowledge (r = 0.176, p < 0.01), and GPA (r = 0.120, p = 0.042), respectively.

Table 2. Pearson correlations among intention score, psychosocial factors, demographics, and knowledge (N = 211)

Variable	1	2	3	4	5	6	7	8
1. Behavior score	—							
2. Knowledge	0.18**	—						
3. Gender	-0.08	0.05	—					
4. Age	-0.04	0.10	-0.01	—				
5. Grade point average	0.12*	-0.02	-0.02	0.00	—			
6. Absenteeism	-0.11	0.13*	-0.05	-0.23**	-0.01	—		
7. Attitude score	0.38**	0.27**	-0.14*	-0.04	0.03	-0.04	—	
8. Norm score	0.38**	0.36**	-0.11	0.06	0.12	0.02	0.52**	—
9. Intention score	0.68**	0.16*	-0.16*	-0.01	0.01	-0.09	0.43**	0.41**

Note. Gender coded as 0 = male, 1 = female; *p < 0.05, **p < 0.01 (1-tailed)

The behavioral intention score was significantly correlated with attitude (r = 0.432, p < 0.01), subjective norms (r = 0.413, p < 0.01), and knowledge (r = 0.162, p = 0.009), and was negatively associated with gender (r = -0.162, p = 0.009), suggesting that girls may report higher intentions. Attitude and norm scores were also strongly correlated (r = 0.524, p < 0.01), reinforcing their combined influence on intention and behavior.

Factors explaining respiratory infection prevention behavior

A three-step hierarchical multiple regression analysis was conducted to examine the effects of demographic profiles, psychological and social variables, and intended behavior on actions taken to prevent respiratory infections among late school-age children (**Table 3**).

Table 3. Hierarchical regression analysis predicting respiratory infection prevention behavior (N = 211)

Variables	B	SE	β	t	p-value
Model 1					
(Constant)	14.763	4.317	—	3.419	0.001
Gender	-0.712	0.485	-0.099	-1.467	0.144
Age	-0.141	0.339	-0.029	-0.416	0.678
Grade point average	1.075	0.597	0.121	1.801	0.073
Absenteeism	-0.978	0.503	-0.135	-1.942	0.053
Knowledge score	0.491	0.164	0.204	2.997	0.003
$R = 0.273$, $R^2 = 0.075$, Adjusted $R^2 = 0.052$, R^2 Change = 0.075, Overall $F_{(5,205)} = 3.310$, p = 0.007					
Model 2					
(Constant)	5.618	4.336	—	1.296	0.197
Gender	-0.235	0.457	-0.033	-0.514	0.607
Age	-0.114	0.316	-0.023	-0.361	0.719
Grade point average	0.751	0.559	0.085	1.343	0.181
Absenteeism	-0.790	0.468	-0.109	-1.687	0.093
Knowledge score	0.117	0.165	0.049	0.710	0.478

Table 3. Hierarchical regression analysis predicting respiratory infection prevention behavior (N = 211) (Cont.)

Variables	B	SE	β	t	p-value
Attitude score	0.220	0.068	0.241	3.233	0.001
Subjective norms score	0.180	0.061	0.225	2.927	0.004
$R = 0.461$, $R^2 = 0.212$, Adjusted $R^2 = 0.185$, R^2 Change = 0.138, Overall $F_{(7,203)} = 17.750$, $p < 0.001$					
Model 3					
(Constant)	1.066	3.492	—	0.305	0.760
Gender	0.215	0.362	0.032	0.595	0.553
Age	-0.106	0.252	-0.022	-0.421	0.674
Grade point average	0.943	0.447	0.150	2.111	0.036
Absenteeism	-0.693	0.460	-0.119	-1.507	0.133
Knowledge score	0.105	0.132	0.044	0.796	0.427
Attitude score	0.400	0.222	0.084	1.797	0.074
Subjective norms score	0.051	0.044	0.064	1.146	0.253
Intention score	0.476	0.044	0.619	10.758	< 0.001
$R = 0.707$, $R^2 = 0.499$, Adjusted $R^2 = 0.479$, R^2 Change = 0.287, Overall $F_{(8,202)} = 115.740$, $p < 0.001$					

Note. Gender coded as 0 = male, 1 = female

In Model 1, demographic variables including gender, age, GPA, absenteeism, and knowledge score were entered, explaining 7.5% of the variance in respiratory infection prevention behavior. Among these, only the knowledge score was a statistically significant predictor.

In Model 2, psychosocial variables (attitude and subjective norms) were added after controlling for demographic factors. These variables accounted for an additional 13.8% of the variance. Together, the variables in this model explained 21.2% of the variance in respiratory infection prevention behavior. Both attitude and subjective norms were statistically significant predictors at this stage.

In Model 3, behavioral intention was included. After controlling for demographic and psychosocial variables, behavioral intention significantly increased the explained variance by 28.7%. Approximately 49.9% of the variance in preventive behavior related to respiratory infections was described by the final model. Behavioral intention emerged as the strongest and most significant predictor of preventive behavior. GPA also showed a significant positive effect on respiratory infection prevention behavior.

Discussion

The model explaining respiratory infection prevention behavior among late school-age children in public schools accounted for 49.9% of the variance, with GPA and behavioral intention being significant predictors. This finding highlights the crucial role of motivational and cognitive factors in health behavior among this population.

Regarding the demographic variables, GPA was the only significant predictor in the final model. This suggests that students with higher academic performance were more likely to engage in preventive behaviors. This finding is consistent with previous research indicating that students with higher academic achievement tend to practice better health behaviors. A higher GPA may reflect greater self-discipline and health awareness, both of which contribute to consistent infection prevention practices.[30,36] Other demographic variables, such as gender, age, and absenteeism, were not significant in the final model, which aligns with some studies that have shown inconsistent associations between demographic characteristics and preventive health behaviors in children.[6] While knowledge was

positively correlated with behavior, it was not a significant predictor in the final regression model. This suggests that while knowledge may be a prerequisite for behavior change, it is not sufficient on its own to drive preventive action, reinforcing the importance of intention and motivational constructs. Similar findings have been reported in previous studies where knowledge alone failed to predict consistent behavioral adherence in school settings.[4]

It should be emphasized that attitude and subjective norms were added to the regression model as psychosocial predictors, based on the Theory of Reasoned Action (TRA), and they significantly improved the predictive model in Step 2, accounting for an additional 13.8% of the model's variance. Although both variables showed moderate bivariate correlations with behavior, their predictive power diminished in the final model when behavioral intention was included. This suggests that the influence of attitudes and norms may operate indirectly through behavioral intention, rather than exerting direct effects. These findings support prior research indicating that beliefs about the benefits of mask-wearing, handwashing, and social approval from parents and teachers can shape children's intentions.[5] Similarly, Nguyen et al.[24] found that while attitudes significantly predicted children's behavioral intentions, subjective norms had weaker direct effects, reinforcing the notion that these factors influence behavior primarily through intention.

Regarding the behavioral intention, the most critical finding of this study is the strong predictive power of behavioral intention, which accounted for an additional 28.7% of variance in behavior in the final model. This result aligns closely with the TRA framework, which posits intention as the immediate determinant of behavior. Children who reported higher intention scores were substantially more likely to engage in preventive behaviors such as wearing masks, washing hands, and avoiding shared items. This finding is consistent with earlier research that emphasizes the role of motivational commitment and perceived behavioral control in translating knowledge and attitudes into action.[11] It is also supported by Morrison et al.,[23] who applied the TRA framework and found that intention was the strongest predictor of health-related behaviors among children, surpassing the direct effects of attitudes and subjective norms. These findings reinforce the critical role of intention in shaping behavior and validate its central place within the TRA model.

Limitations

There are a number of limitations to acknowledge. Firstly, the cross-sectional nature of the study restricts causal interpretations, making it impossible to determine the direction of relationships. Second, all measures were self-reported by children, which may introduce social desirability bias, potentially leading to an overestimation of positive attitudes and preventive behaviors. Third, even though the reliability of the two instruments, the Knowledge About Respiratory Infections and Respiratory Infection Prevention Behavior Questionnaires, was acceptable in the pilot study, it was relatively low in the actual study. This might be because these two instruments were multidimensional constructs; thus, future studies should revise these two instruments and test the construct validity by using exploratory and confirmatory analyses. Fourth, since the study was confined to a particular location, its results may not fully represent other contexts or populations. Lastly, unmeasured confounding variables (e.g., parental health literacy) may have influenced the outcomes, potentially biasing the associations observed.

Conclusion and Implications for Nursing Practice

This study supports the applicability of the Theory of Reasoned Action in understanding the prevention behavior of respiratory infections among late school-age children. While demographic and psychosocial factors play roles, behavioral intention emerges as the most

powerful and direct predictor. Interventions should therefore focus on enhancing intention through targeted messaging, positive reinforcement, and supportive social environments to promote consistent preventive behaviors effectively in school settings. These findings underscore the importance of designing health promotion interventions that go beyond simply providing information. Programs should aim to strengthen students' intentions by enhancing positive attitudes, reinforcing social norms through teacher and parent involvement, and addressing potential barriers to action. School-based health education should incorporate interactive strategies that promote goal setting, modeling, and reinforcement to enhance behavioral intention and facilitate consistent practice. Community health nurses and school nurses can play a vital role in this process by delivering tailored health education, modeling preventive behaviors, and collaborating with families to create a supportive environment that fosters sustained behavior change. Moreover, teachers can support these efforts through daily interactions, classroom modeling, and promoting positive social norms that encourage healthy behaviors among students. As behavioral intention was the strongest predictor of behavior, programs should prioritize activities that build commitment, such as action planning. Attitudes and subjective norms were moderately associated with behavior but showed indirect effects when behavioral intention was taken into account. Educational content should highlight the benefits of preventive behaviors and involve parents, peer groups, or teachers to strengthen normative support. Future studies should employ experimental designs to examine the impact of the developed program on long-term behaviors and the incidence of respiratory tract infections.

Author contributions

Conceptualization, Method and design: R.S., W.L.
Data collection, Drafting the manuscript: R.S.
Data analysis and interpretation: R.S., W.L.
Editing the manuscript: W.L.
Revising the manuscript: R.S., W.L.
Final approval of the manuscript: W.L., P.K.

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ปัจจัยที่สัมพันธ์กับความตั้งใจและพฤติกรรมในการป้องกันการติดเชื้อทางเดินหายใจในเด็กวัยเรียนตอนปลายโรงเรียนของรัฐ : การศึกษาแบบภาคตัดขวาง

รมิดา ทรัพย์ไพบูลย์กิจ วันชัย เลิศวัฒนวิลาศ พิมพาภรณ์ กลั่นกลิ่น*

บทคัดย่อ : โรคติดเชื้อทางเดินหายใจเป็นสาเหตุสำคัญของการเจ็บป่วยในเด็กวัยเรียน แม้จะมีการส่งเสริมพฤติกรรมการป้องกัน เช่น การล้างมือและการสวมหน้ากากอนามัย แต่การปฏิบัติยังคงอยู่ในระดับที่ไม่เหมาะสมในกลุ่มเด็กวัยนี้ ทฤษฎีการกระทำที่มีเหตุผล (Theory of Reasoned Action) ระบุว่า เจตนาพฤติกรรมซึ่งเกิดจากทัศนคติและบรรทัดฐานทางสังคม เป็นปัจจัยใกล้ชิดที่สุดที่ส่งผลต่อพฤติกรรม การศึกษาปัจจัยเชิงอธิบายภาคตัดขวางนี้ดำเนินการศึกษาในประเทศไทย โดยที่โรคติดเชื้อทางเดินหายใจ ยังเป็นปัญหาสำคัญทางสาธารณสุขและการมีพฤติกรรมการป้องกันโรคที่ยั่งยืนยังคงเป็นสิ่งที่ท้าทาย การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยทำนายของตัวแปรปัจจัยส่วนบุคคล ทัศนคติ บรรทัดฐานทางสังคม และเจตนาพฤติกรรมต่อพฤติกรรมการป้องกันการติดเชื้อทางเดินหายใจในเด็กวัยเรียนตอนปลาย กลุ่มตัวอย่างประกอบด้วยนักเรียนในวัยเรียนตอนปลาย จากโรงเรียนระดับประถมศึกษาของภาครัฐ จำนวน 211 คน เก็บรวบรวมข้อมูลโดยใช้แบบสอบถาม ประกอบไปด้วย ข้อมูลส่วนบุคคล ความรู้ ทัศนคติ บรรทัดฐานทางสังคม เจตนาพฤติกรรม และ พฤติกรรมการป้องกัน โดยใช้การวิเคราะห์ถดถอยเชิงลำดับชั้น

ผลการศึกษาพบว่า ตัวแปรทางประชากร ประกอบด้วย เพศ อายุ ผลการเรียน ประวัติการขาดเรียนจากการเจ็บป่วยด้วยโรคทางเดินหายใจ ความรู้ รวมถึงทัศนคติ บรรทัดฐานทางสังคม และเจตนาพฤติกรรม สามารถอธิบายความแปรปรวนของพฤติกรรมการป้องกันโรคได้ร้อยละ 49.9 โดยเจตนาพฤติกรรมเป็นตัวทำนายที่มีอิทธิพลมากที่สุด ดังนั้น กลยุทธ์การส่งเสริมควรมุ่งเน้นที่การเสริมสร้างเจตนาผ่านทัศนคติด้วยการพัฒนาเนื้อหาด้านสุขศึกษาโดยการเน้นประโยชน์ของพฤติกรรมการป้องกันโรค และบรรทัดฐานทางสังคมโดยการมีส่วนร่วมของบุคคลสำคัญ เช่น ผู้ปกครอง กลุ่มเพื่อน หรือ ครู เพื่อให้เกิดการเปลี่ยนแปลงพฤติกรรมอย่างต่อเนื่องและยั่งยืน แต่อย่างไรก็ตาม ควรมีการทดสอบประสิทธิผลของกิจกรรมดังกล่าวก่อนนำไปใช้จริงในการปฏิบัติ

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คำสำคัญ: พฤติกรรมสุขภาพ การป้องกันการติดเชื้อ การป้องกันการติดเชื้อทางเดินหายใจ เด็กวัยเรียนตอนปลาย ทฤษฎีการกระทำที่มีเหตุผล

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