

# BMJ Open Influence of social responsibility and pandemic awareness of nursing students on COVID-19 preventive behaviours: a cross-sectional online survey in South Korea

Minji Kim ,<sup>1</sup> Hyeonkyeong Lee <sup>2</sup>

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<sup>1</sup>Graduate School, Yonsei university College of Nursing, Seoul, Republic of Korea  
<sup>2</sup>Mo-Im Kim Nursing Research Institute, Yonsei University College of Nursing, Seoul, Republic of Korea

**Correspondence to**  
Dr Hyeonkyeong Lee;  
hlee39@yuhs.ac

## ABSTRACT

**Objectives** Factors influencing COVID-19 preventive behaviour require exploration to strengthen the response competencies of prehealthcare professionals and reduce the pandemic's impact. This study aimed to identify the level of COVID-19 preventive behaviour among Korean nursing students and to determine the influence of social responsibility and pandemic awareness to present educational strategies for reducing disaster impact.

**Methods and analysis** As a cross-sectional descriptive survey study using an online questionnaire, the participants were convenience sampled from one online community for nursing students and three nursing colleges located in Seoul, South Korea. The data from 590 participants were analysed by t-test, analysis of variance, Pearson's correlation and linear multiple regression using SPSS.

**Results** The factors influencing COVID-19 preventive behaviour were identified to be social responsibility (linear regression coefficient 0.354, 95% CI 0.243 to 0.464), pandemic awareness (linear regression coefficient 0.131, 95% CI 0.025 to 0.237), impact of COVID-19 on daily life (linear regression coefficient 0.085, 95% CI 0.019 to 0.152) and living in Daegu/Gyeong-buk area (linear regression coefficient 0.134, 95% CI 0.024 to 0.244).

**Conclusion** Based on the findings that social responsibility and pandemic awareness are key predictors of COVID-19 preventive behaviour, customised educational programmes and additional studies are recommended for raising social responsibility and pandemic awareness among prehealthcare professionals as a part of disaster response.

## BACKGROUND

The first case of COVID-19 was reported in China on 31 December 2019.<sup>1</sup> On 11 March 2020, the WHO declared COVID-19 to be a global pandemic<sup>2</sup> and for about 2.5 years, it continues to have a major impact worldwide. During this global crisis, healthcare workers have been at risk of developing mental health problems due to the uncertainty of transmission, lack of definitive management protocols

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ In this study, the online survey was found to be a useful mode of data collection in a relatively short period of time during the early stage of COVID-19 pandemic.
- ⇒ This study attempted to quantify the concept of social responsibility, which is rarely measured despite the core value that forms the professional attitudes and behaviours of nursing students.
- ⇒ The correlates of COVID-19 preventive behaviours were limited only to the individual level although, it has been reported that environmental and policy factors affect preventive behaviours during the COVID-19 pandemic.
- ⇒ The study population was limited to Korean nursing students indicating that the findings from this study might not be applicable to the population in other settings because the responses to COVID-19 pandemic situation vary depending on the country-specific context.

and excessive workloads, with increased stress and anxiety levels.<sup>3</sup> Nevertheless, many nurses have expressed a sense of social responsibility in caring for suffering patients and fighting against COVID-19, while a higher level professional identity has been demonstrated by front-line nurses as compared with non-front-line nurses.<sup>4</sup> Nurses continue to advocate for health equity for people at risk of spreading COVID-19 in terms of health communication, testing and treatment as well as service accessibility for non-COVID-19 patients.<sup>5</sup>

In the early stages of the COVID-19 pandemic, prior to vaccine availability, the primary community control measures included hand washing, mask-wearing and social distancing.<sup>6</sup> Pandemics are global public health emergencies that can cause acute resource shortages. In such cases, preventive behaviours, including coughing

etiquette, hand hygiene and mask-wearing, could be considered a key disaster response strategy.<sup>7</sup>

Prehealthcare professionals need to exhibit a high level of COVID-19 preventive behaviour during a pandemic, similar to healthcare professionals. Due to their frequent contact with the hospital environment during their clinical practice, they may directly or indirectly affect patients and clients; they may also be assigned to an actual site of disaster as reserve personnel.<sup>8,9</sup> Moreover, they are vulnerable to mass infection due to being in spaces with high population density, such as schools.<sup>10</sup> There have been numerous attempts to identify the disaster response competencies of nursing students, although studies identifying them under a pandemic situation have rarely been conducted. While previous studies mostly examined disaster planning, disaster command systems, decontamination, communication and ethical issues as core competencies, they did not report consistent results.<sup>11,12</sup> Several studies have reported that this difference comes from gap between knowledge and competencies,<sup>12</sup> and one study discussed that it is difficult to aware a pandemic as a disaster, unlike other kinds of disasters.<sup>13</sup>

Furthermore, nurses' participation rate in pandemic response has been reported to be low, compared with the willingness for overall disaster response participation.<sup>14,15</sup> However, this motivation to participate in pandemic response has not been fully explained. Several qualitative studies have simply explored that this may be based on nurses' 'social responsibility',<sup>16-18</sup> which means 'to advocate needs of other people and to implement that reflects a focus on social issues affecting contemporary global society and community'.<sup>19</sup>

In a pandemic, nursing students are prehealthcare professionals who either can be actual responders that implement mitigation measures or potential responders who will respond to future pandemics. Therefore, it is important to explain the competencies of nursing students more, specifically in a pandemic context and to require nursing educators to take action to instil curricula and practices to prepare nursing students to take social responsibility.

The objective of this study was to contribute to the establishment of educational strategies for prehealthcare professionals by identifying the relationship among social responsibility, pandemic awareness and COVID-19 preventive behaviour among nursing students.

## METHODS

### Design

This was a cross-sectional descriptive survey study, conducted in an online setting following the principles of non-face-to-face and minimal contact in a pandemic. The survey used a structured questionnaire consisting of 62 items that asked about social responsibility, pandemic awareness, COVID-19 preventive behaviour, effect of COVID-19 on daily life, COVID-19 stress and general characteristics (see online supplemental appendix 1).

## Participants

Korean nursing students (freshmen to seniors) were convenience sampled in a nationwide online club for nurse and nursing students and three nursing colleges located in Seoul, South Korea. Data were collected from 14 May 2020 to 24 May 2020. Based on 17 administrative districts by area of residence, the required sample size for analysis of variance (ANOVA) was calculated using the G\*Power V.3.1 software with the parameters of a significance level of 0.05, statistical power of 0.95 and a medium effect size of 0.25. The result indicated a minimum sample size of 476; considering nonresponse rate of 20%, ideal sample size of 595. Ultimately, 591 participants took part. After excluding 1 case with duplicate phone numbers and data, the data from 590 participants who answered all the questions were analysed.

## Measures

### Social responsibility

Social responsibility was measured using the instrument originally developed in Conrad and Hedin and subsequently adapted to Korean by Kim's (1999) dissertation.<sup>20,21</sup> This instrument consisted of 27 items. Each item is graded on a 5-point Likert scale, from 1='not at all' to 5='very much'. The score is calculated as a mean score, with a higher score indicating a higher level of social responsibility. In the current study, the reliability as estimated by Cronbach's alpha was 0.88, which was higher than the reliability at the time the instrument was developed (Cronbach's alpha=0.70).

### Pandemic awareness

Pandemic awareness was measured using an instrument developed by Lee *et al* and subsequently modified and supplemented by Han *et al*, which was specified for a pandemic situation by the researcher.<sup>22,23</sup> This instrument consisted of 17 items. Each item is graded on a 5-point Likert scale, from 1='not at all' and 5='very much'. The score is calculated as a mean score, with a higher score indicating a higher level of pandemic awareness. The reliability of the instrument at the time of development was Cronbach's alpha=0.80 and reliability was assured in the present study with Cronbach's alpha=0.73.

### COVID-19 preventive behaviour

COVID-19 preventive behaviour was measured using the instrument originally developed by Kim and Park for measuring MERS preventive behaviour,<sup>24</sup> which was subsequently modified by authors based on the COVID-19 prevention rules issued by the Korea Disease Control and Prevention Agency. This instrument consisted of 10 items related to hand washing, coughing etiquette and social distancing. Each item is graded on a 5-point Likert scale, from 1='never' to 5='always'. The score is calculated as a mean score, with a higher score indicating greater practice of COVID-19 preventive behaviour. In the current study, the reliability as estimated by Cronbach's alpha was

**Table 1** COVID-19 preventive behaviours by participant characteristics (N=590)

Characteristics	n(%)	Mean±SD	T of F*	P value (post hoc test)
Grade				
Freshman	56 (9.5)	4.46±0.45	0.592	.620
Sophomore	131 (22.2)	4.38±0.55		
Junior	149 (25.3)	4.38±0.53		
Senior	254 (43.1)	4.36±0.52		
Voluntary service				
Yes (Regular) <sup>a</sup>	85 (14.4)	4.54±0.47	6.888	.001 (a>b, a>c)
Yes (Intermittent) <sup>b</sup>	406 (68.8)	4.37±0.52		
No <sup>c</sup>	99 (16.8)	4.26±0.54		
Pandemic education experience				
Yes	97 (16.4)	4.45±0.53	1.110	.330
No	380 (64.4)	4.36±0.52		
Don't know	112 (19.0)	4.39±0.53		
Disaster experience				
Yes	133 (22.7)	4.37±0.52	-0.164	.870
No	453 (77.3)	4.38±0.52		
Information source				
Television	170 (28.8)	4.40±4.40	10.051	.076
YouTube	23 (3.9)	4.31±4.31		
SNS	142 (24.1)	4.29±4.29		
Messenger	11 (1.9)	4.25±4.25		
KDCA homepage	42 (7.1)	4.52±4.52		
Public disaster alarm system	68 (11.5)	4.50±4.50		
Internet portal	128 (21.7)	4.36±4.36		
Private information website	6 (1.0)	4.52±4.52		
Residential areas				
Daegu and Gyeong-buk	87 (14.7)	4.48±0.43	-2.278	.024
All other areas	503 (85.3)	4.36±0.54		

\*t-tests for differences between two groups, F-statistic for >2 groups.

KDCA, Korea disease control and prevention agency; SNS, social networking service.

0.84 which was analogous level of reliability at the time the instrument was developed (Cronbach's alpha=0.84).

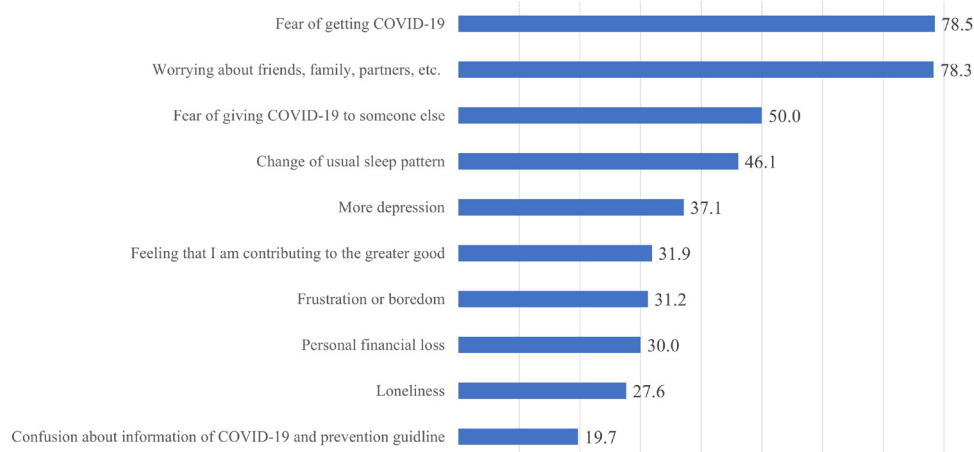
### General characteristics

General characteristics of the participants included grade in school, volunteer service experience and area of residence. In addition, the study captured

COVID-19-related characteristics, including pandemic response education experience, disaster experience, COVID-19-related information source, COVID-19 impact on daily life and psychosocial impact of COVID-19. The COVID-19 impact on daily life was measured by a single item asking 'How much did COVID-19 impact your day-to-day life?' and the response was recorded on a 5-point Likert scale (1='not at all', 5='extremely'). Thus, the higher the score, the greater COVID-19's impact on daily life. The psychosocial impact of COVID-19 was measured by asking 'Which of the following did you experience during COVID-19?' adopted from the Pandemic Stress Index using an 18-item checklist.<sup>25</sup> The participants were allowed to choose multiple options and the number of options were summed up as an individual score; the higher the score the greater the psychosocial impact of COVID-19.

**Table 2** Level of social responsibility, pandemic awareness, COVID-19 impact and COVID-19 preventive behaviours of nursing students (N=590)

Variable (No of items)	Mean±SD	Observed range
Social responsibility (27)	3.84±0.42	2.49–4.97
Pandemic awareness (17)	3.88±0.42	2.52–5.00
COVID-19 impact on daily life (1)	4.58±0.60	1–5
Psychosocial impact of COVID-19 (18)	4.93±2.40	0–14
COVID-19 preventive behaviours (10)	4.38±0.52	2.40–5.00



**Figure 1** The 10 most common episodes experienced during COVID-19 (%).

### Procedure

After constructing the online questionnaire using a Google Forms, officials from each recruiting centre were contacted to request their cooperation and a recruitment message was posted in one online community for nursing students and three nursing colleges located in Seoul, South Korea. The candidates gained access to the online questionnaire through the recruitment message link and QR code. Before participating in the survey, the participants were provided with an explanation that included basic ethical principles for participant protection, such as the confidentiality and the possibility of voluntary participation and withdrawal. After reading an explanation, those interested in participating were instructed to click on a 'button' in response that they read the consent information and agreed to participate, followed by viewing the survey questionnaire. Completed questionnaires were retrieved immediately to the researcher's password-protected computer. On completion of data collection, a gift ticket (US\$3 worth) of appreciation was sent via short message service (SMS).

### Data analysis

Descriptive statistics such as frequency, percentage, mean and SD were used to describe general characteristics of the participants. Correlations between major variables (social responsibility, pandemic awareness, COVID-19 impact and the COVID-19 preventive behaviour) were analysed using Pearson's correlation coefficients. COVID-19

preventive behaviour according to general characteristics was estimated by t-test or ANOVA. Factors influencing COVID-19 preventive behaviour were identified using multiple linear regression analysis.

### Patient and public involvement

No patients nor the public were involved in the design, conduct, reporting or dissemination plans of this study.

## RESULTS

### COVID-19 preventive behaviour by participant characteristics

Among the participants, 43.1% were seniors and 68.8% intermittently participated in volunteer activities. Only 16.4% had pandemic education experience, while 22.7% had disaster experience, including experience with earthquakes and typhoons. The results also showed that 28.8% obtained COVID-19-related information through television and 14.7% lived in Daegu/Gyeongbuk (table 1). The Daegu/Gyeongbuk area was the region with the highest number of confirmed cases in South Korea during the data collection period. The results also showed statistically significant differences in preventive behaviour based on whether participants regularly participated in volunteer activities ( $F=6.888$ ,  $p=.001$ ) or lived in Daegu/Gyeongbuk ( $t=-2.278$ ,  $p=.024$ ) (table 1).

**Table 3** Correlation between social responsibility, pandemic awareness and COVID-19 preventive behaviours (N=590)

Variable	Social responsibility	Pandemic awareness	COVID-19 impact on daily life	Psychosocial impact of COVID-19	COVID-19 preventive behaviours
Social responsibility	1				
Pandemic awareness	.478*	1			
COVID-19 impact on daily life	.208*	.167*	1		
Psychosocial impact of COVID-19	.038	.039	-.044	1	
COVID-19 preventive behaviours	.358*	.252*	.186*	-.039	1

\* $p<.001$ .

**Table 4** Factors on COVID-19 preventive behaviours (N=590)

Variables	Unstandardised regression coefficients			
	Coef.	SD	95% CI	T (p value)
(Constant)	2.081	0.239		8.694(<.001)
Social responsibility	0.354	0.056	0.243 to 0.464	6.289(<.001)
Pandemic awareness	0.131	0.054	0.025 to 0.237	2.419(.016)
COVID-19 impact on daily life	0.085	0.034	0.019 to 0.152	2.528(.012)
Voluntary service*				
Yes (regular)	0.003	0.055	-0.105 to 0.111	0.052(.958)
Yes (intermittent)	0.132	0.073	-0.012 to 0.276	1.803(.072)
Residential areas†				
Daegu and Gyeong-buk	0.134	0.056	0.024 to 0.244	2.398(.017)
R <sup>2</sup> =.164, Adj R <sup>2</sup> =.156, F=19.108, p<.001				
*Reference: No				
†Reference: All other areas.				

### Level of social responsibility, pandemic awareness, psychosocial impact of COVID-19 and COVID-19 preventive behaviour of nursing students

The mean scores for social responsibility, pandemic awareness, COVID-19 impact on daily life and COVID-19 preventive behaviour were  $3.84 \pm 0.42$ ,  $3.88 \pm 0.42$ ,  $4.58 \pm 0.60$  and  $4.38 \pm 0.52$  out of 5 possible points, respectively. The mean score of psychosocial impact of COVID-19 was  $4.93 \pm 2.40$  ranging from 0 to 14 (table 2). Concerning psychosocial impact of COVID-19, in the total episode that the participants experienced during COVID-19 (multiple responses accepted), the 10 most common episodes' percentage is shown in figure 1. The three most experienced episodes were 'fear of getting COVID-19 (78.5%)', followed by 'worrying about friends, family, partners, etc' (78.3%) and 'fear of giving COVID-19 to someone else' (50.0%).

### Relationships among social responsibility, pandemic awareness, COVID-19 impact and COVID-19 preventive behaviour of nursing students

There were positive correlations among the variables social responsibility and COVID-19 preventive behaviour ( $r=.358$ ,  $p<.001$ ), pandemic awareness and COVID-19 preventive behaviour ( $r=.252$ ,  $p<.001$ ), and social responsibility and pandemic awareness ( $r=.478$ ,  $p<.001$ ). Impact of COVID-19 on daily life showed a significantly positive relationship with COVID-19 preventive behaviour ( $r=.186$ ,  $p<.001$ ), indicating that higher levels of COVID-19 impact were related to higher levels of practice of COVID-19 preventive behaviours (table 3). Additional analysis results showed that social responsibility was statistically significantly high among those participating in volunteer activities ( $t=5.683$ ,  $p<.001$ ) and those with disaster experience ( $t=1.979$ ,  $p=.048$ ).

### Factors influencing COVID-19 preventive behaviour

A multiple linear regression was performed with the input of effect of COVID-19 on daily life, volunteer activities and area of residence, which were major variables that showed significant differences in the univariate analysis with

COVID-19 preventive behaviours. In the multicollinearity test, the tolerance of the independent variables was higher than 0.1 (0.593–0.991) and the variance inflation factor was lower than 10 (1.009–1.688), which confirmed that there was no problem with multicollinearity. The model was statistically significant, and the coefficient of determination was 16.4% ( $F=19.108$ ,  $p<.001$ ). The factors significantly associated with COVID-19 preventive behaviour were social responsibility, pandemic awareness, COVID-19 impact on daily life and living in the Daegu/Gyeong-buk area (table 4). When each factor increased by one unit, COVID-19 preventive behaviour increased by 0.35 ( $p<.001$ ), 0.13 ( $p=.016$ ), 0.09 ( $p=.012$ ), 0.13 ( $p=.017$ ) (table 4).

### DISCUSSION

The findings showed that the levels of social responsibility, pandemic awareness and COVID-19 preventive behaviour were high among Korean nursing students and that these factors were positively correlated with each other. Moreover, social responsibility and pandemic awareness were identified as factors influencing COVID-19 preventive behaviours.

The mean COVID-19 preventive behaviour of Korean nursing students was 4.38 out of 5 points. On previous studies that used similar instruments to measure the level of practising MERS preventive behaviour among nursing and medical college students, the mean of COVID-19 preventive behaviour was 4.51 out of 10 points. Compared with previous study, in the present study the level of COVID-19 preventive behaviour was higher.<sup>26</sup> Such results may be due to COVID-19 being declared a global pandemic, whereas MERS was not declared a global public health emergency. Theory of planned behaviour explains that three determinants of attitude, subjective norm and perceived behavioural control form behavioural intention and that is direct antecedents of behaviour.<sup>27</sup> South Korea government implemented strict



measures such as limited operation of high-risk facilities such as churches and restaurants, imposition of fines on persons not wearing face masks in public places, based on its experience from the MERS outbreak. As a result, these factors may have acted as subjective norm. However, even compared with previous studies on preventive behaviour during the 2009 H1N1 pandemic, which was officially declared a pandemic, the results of the present study showed a higher level of preventive behaviour. COVID-19 preventive behaviour was practised at a higher level when COVID-19 had a greater effect on daily life and among those who live in the Daegu/Gyeongbuk area. The measurement of the effect of COVID-19 on daily life was measured by a single item on a 5-point Likert scale, while the Daegu/Gyeongbuk area was the region with the highest number of confirmed cases in South Korea. Such results could be interpreted in the same context as previous studies that reported that perceived concerns, anxiety and perceived efficacy can improve preventive behaviour.<sup>28 29</sup>

The findings of this study demonstrated the effect of people's perception of a situation on their preventive behaviour. Existing studies on the relationship between disaster awareness and response have reported inconsistent results.<sup>30 31</sup> It is believed that the findings in this study are because a pandemic is a form of disaster, but it should not be overlooked that the pandemic has been perceived differently from other forms of disasters.<sup>13 15</sup> Considered together with the additional analysis results from the present study, which showed statistically significantly higher pandemic awareness among students with pandemic education experience ( $F=6.808$ ,  $p<.01$ ), customised education for specific disasters should be added to educational strategies suggested for disaster preparedness.<sup>32</sup>

Meanwhile, social responsibility was identified as the factor with the strongest association with COVID-19 preventive behaviour in the outcome model of the present study. The mean score for social responsibility among Korean nursing students was 3.84 out of 5 points, which was higher than the score reported in previous studies on nursing students and college students in other majors.<sup>33</sup> This difference could be attributed to the fact that previous studies were conducted at ordinary times, whereas the present study was conducted under a disaster situation. In a qualitative synthesis study,<sup>34</sup> professional values such as 'responsibility to care' were discussed as a competency for infectious disease nursing. But studies have reported that under a disaster situation, especially a pandemic, health disparity worsens according to economic level and race.<sup>34 35</sup> Under such circumstances, society is demanding more social responsibility and appropriate behaviour from healthcare professionals, along with a reorganisation of the healthcare delivery system.<sup>36-40</sup>

The findings in the present study showed that social responsibility had a significant association with COVID-19 preventive behaviour, and thus, consideration of social

responsibility when delivering education could be a practical strategy for strengthening disaster response competencies. Given the positive relationship between social responsibility and the volunteer experiences of nursing students in the current study, service-learning programmes with various vulnerable populations are recommended for nursing students. Community service learning was found to be an effective pedagogical module for health professional students to enhance their sense of social responsibility.<sup>41</sup> Accordingly, providing opportunities to understand health disparity during a disaster through regular participation in volunteer programmes and planning simulation programmes that allow indirect experience and immersion in disaster situations could help improve social responsibility, which could ultimately be a practical educational strategy for disaster response.

In the present study, since the measured concept were limited to the individual level, there were limitations in investigating the correlations with environmental factors such as having dependents, job security and vaccine availability, which have been reported to be factors influencing non-participation in pandemic response. Furthermore, the study population was confined to part of Korean nursing students and conveniently sampled. It differs from other countries concerning pandemic experience or government response and it has limitation in generalisation as well. Therefore, it is necessary to consider the local context (eg, historical, social) when extending inferences from the current study to populations in other settings.

## CONCLUSIONS

The present study's significance lies in the fact that it tested the factors influencing disaster response under a unique disaster situation and introduced the exploratory concept of social responsibility as a measurable variable. As part of future strategies to strengthen disaster response competencies of nursing students, customised educational programmes for unique disaster awareness, developmental studies on simulation for inclusion of social responsibility, and correlation studies considering environmental factors are recommended.

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**Contributors** HL has originally designed the study and MK has acquired and analyzed the data. MK and HL have interpreted the data. MK was responsible for initial drafting of the manuscript and HL has critically revised it. MK and HL have refined and approved the final manuscript, and are the guarantors.

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**Patient consent for publication** Consent obtained directly from patient(s).

**Ethics approval** This study was approved by the Yonsei University Health System, Institutional Review Board (Y-2020-0057). Participants gave informed consent to participate in the study before taking part.

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#### ORCID iDs

Minji Kim <http://orcid.org/0000-0002-1375-7999>

Hyeonkyeong Lee <http://orcid.org/0000-0001-9558-7737>

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