Status and factors associated with musculoskeletal disorders among teachers of selected schools of Pokhara Metropolitan City

Tripathi et al.

International Journal of Occupational and Environmental Safety

Status and factors associated with musculoskeletal disorders among teachers of selected schools of Pokhara Metropolitan City

Niya Tripathi[a], Ganesh Bhandari[b], Kabita Khatiwada[c], Srijana Bhattarai[d]

[a]Modern Technical College, NPL (niyaatripathi@gmail.com), ORCID: 0009-0008-6888-593X, [b]Health Office, Kanchanpur,NPL (bh.ganesaan@gmail.com), ORCID: 0000-0001-7637-6969, [c]Modern Technical College, NPL (Kabita.khatiwada@gmail.com), ORCID: 0009-0009-5927-8000, [d]Modern Technical College, NPL (srijana.bhattarai24@gmail.com), ORCID: 0000-0002-1730-2158

Abstract

Musculoskeletal disorders are common and significant health problems affecting muscles, ligaments, tendons, nerves, bones, and joints. This study aimed to assess the status and associated factors of musculoskeletal disorders (MSDs) among school teachers. A cross-sectional study was conducted among 126 school teachers selected by cluster sampling method, using a standard Nordic questionnaire to collect data. The data collected was entered into Epi-data version 4.6 and analyzed using SPSS version 25. The status of MSDs was 71% over the previous 12 months, 63% of work-limiting pain, and 56% over the previous 7 days. Of these, 23% reported neck problems, 36% shoulder problems, 13% elbow problems, 27% wrist and hand problems, 24% upper back problems, 42% lower back problems, 16% hip or thigh problems, 24% knee problems, and 32% ankle or foot problems. The study found that MSDs were significantly associated with sex factors (p= 0.001) and sleep disturbance in school teachers (p=0.027). More than half of the teachers had reported a prevalence of musculoskeletal disorders due to their profession of school teaching. The study revealed that MSDs are significantly associated with sex factors and sleep disturbance.

1. INTRODUCTION

Musculoskeletal disorders (MSDs) are defined by the World Health Organization (WHO) as conditions affecting muscles, bones, joints, tendons, and ligaments. These disorders include a broad spectrum of inflammatory and degenerative conditions that impact the musculoskeletal system. They can arise from single incidents or cumulative trauma over time, significantly affecting an individual's ability to perform daily activities and work-related tasks (Althomali, Amin, Alghamdi, & Shaik, 2021). Work-related musculoskeletal disorders (WMSDs) are a significant subset of MSDs, influenced by occupational activities that involve repetitive motion, forceful exertion, awkward postures, and exposure to vibration.

The International Labour Organization (ILO) identifies these risk factors as prevalent in various work environments, including the teaching profession. Teaching is often referred to as the "mother of all professions" due to its foundational role in society. Despite its critical importance, teaching is recognized as a highly stressful occupation (Amit & Malabarbas, 2020). Teachers are vulnerable to a range of physical and mental health problems caused by work-related factors. Numerous studies, for instance, have revealed that between 12 to 84% of school teachers have MSD (Ng, Voo, & Maakip, 2019). These

Status and factors associated with musculoskeletal disorders among teachers
of selected schools of Pokhara Metropolitan City

Tripathi et al.

disorders not only impact teachers' health and quality of life but also have broader implications for their job performance and the overall educational environment.

The significance of analyzing MSDs in teachers lies in their unique occupational characteristics. Unlike many other professions, teachers are required to maintain prolonged periods of standing, engage in repetitive movements such as writing on boards or preparing teaching materials, and often work in environments with suboptimal ergonomic design. These factors place teachers at a particularly high risk for developing MSDs. While substantial research has been conducted on MSDs in other occupational groups such as the automotive industry and healthcare workers, the teaching profession remains underrepresented in this area of study. Given the global prevalence of MSDs and their detrimental effects on workforce productivity, understanding their impact on teachers is essential for promoting occupational health and enhancing the quality of education delivery.

The prevalence of MSDs among teachers can be attributed to several factors. Prolonged standing, repetitive movements such as writing on boards or preparing materials, and maintaining awkward postures for extended periods are common in teaching. Additionally, the lack of adequate rest breaks and the physical layout of classrooms can exacerbate these conditions. Understanding these factors is crucial for developing effective preventive strategies (Althomali et al., 2021).

This study aims to assess the prevalence of MSDs among teachers in selected schools of Pokhara Metropolitan City and to identify the factors associated with these disorders. By exploring the specific conditions and work-related factors contributing to MSDs in this population, this research seeks to inform the development of targeted interventions. These interventions can improve the well-being and productivity of teachers, ultimately enhancing the quality of education they provide.

2. METHODOLOGY

2.1 Study design and sample size

This study was a quantitative, cross-sectional design. The sample size was determined to be 126 teachers. The sampling unit was the individual school teacher within the selected schools. A cluster sampling technique was used, consisting of two stages. In the first stage, schools were selected using the probability proportional to size (PPS) method. In the second stage, teachers were selected using a systematic random sampling technique.

2.2 Sample size calculation

The sample size was calculated using Equation 1.

$$n = g \times \frac{Z^2 P(1-P)}{d^2} \tag{1}$$

Where:

Design effect (g) = 2
Z-score for 90% confidence level = 1.64
Prevalence (p) = 69% = 0.69 (P. Bhattarai et al., 2019)
q (1 - p) = 1 - 0.69 = 0.31
Margin of error (d) = 10% = 0.1
By taking the non-response rate of 10% total sample size of 126 was taken.

2.3 Sampling procedure

Among the 33 wards in Pokhara Metropolitan City, one ward (Ward 17) was selected through simple random sampling using the lottery method. Ward 17 contains 16 schools. Using the PPS method, 50% of the total clusters (8 schools) were selected. The cumulative frequency (Cf) was calculated, and the sampling interval (SI) was determined by dividing the total number of teachers (583) by the number of selected clusters (8), resulting in an SI of 72. The first cluster was selected randomly within the range (1, SI), resulting in the selection of the 30th teacher. This process identified New

Status and factors associated with musculoskeletal disorders among teachers
of selected schools of Pokhara Metropolitan City

Tripathi et al.

Millennium Academy as the first selected school. Subsequent schools were selected using the interval method (RS + SI, RS + 2SI, RS + 3SI, etc.).

For the selection of teachers, a systematic random sampling technique was used. The value of "k" was determined by dividing the total number of teachers in the selected clusters (375) by the sample size (126), resulting in a value of approximately 3. The first teacher was chosen using a lottery method, and subsequently, every 3rd teacher was selected.

2.4 Data collection

Data were collected using a self-administered questionnaire. The questionnaire comprised two main parts:

- Musculoskeletal Disorder Assessment: The status of MSDs was measured using the structured Nordic Musculoskeletal Questionnaire (NMQ) (Althomali et al., 2021).
- Socio-Demographic and Work-Related Factors: A semi-structured tool was used to assess socio-demographic, work-related, and behavioral factors. These factors were compiled from an extensive literature review on MSDs among teachers.

2.5 Data verification and entry

Data were verified upon receipt to identify any missing or incomplete information and to correct any errors. Prior to entry into the EPI-data 4.6 version software, data were appropriately structured, processed with coding, and verified to minimize errors. Microsoft Excel was used to clean and input data, which were stored in a password-protected file to prevent loss and error.

2.6 Data Analysis

Data analysis involved the systematic organization and synthesis of research data. Data analysis was performed using SPSS version 25 software. Frequency and percentage computations were used to describe categorical data. Inferential statistics, specifically the chi-square test, were used to identify factors associated with MSDs. A p-value of less than 0.05 was considered statistically significant. For cell values less than 5, the Fisher exact test was applied for continuity correction.

2.7 Ethical Considerations

Ethical approval for the study was obtained from the Star Hospital Research Center - Institutional Review Committee (Ref no: 04/080/081). Informed consent was obtained from all participants before data collection. Participants were assured of the confidentiality and anonymity of their responses, and they were informed of their right to withdraw from the study at any time.

3. RESULTS

Table 1 represents the socio-demographic, behavioral, and work-related variables of the respondents. Among the 126 respondents surveyed, there was a higher percentage of females (62%) compared to males (38%). The majority of respondents fell within the age group of 36 to 55 years old, constituting 50% of the total. Brahmin/Chhetri was the most commonly identified ethnic group (56%), followed by Janajati at 14%. In terms of religion, Hinduism was the most common, with 93% of respondents following it, while 5% identified as Buddhist and 2% as Atheist. Educational levels varied, with 45% having a Master's degree, 44% holding a Bachelor's degree, and 11% having an intermediate level of education. Regarding body weight, 48% of respondents were categorized as normal, 38% as overweight, 13% as obese, and 1% as underweight.

Most respondents (76%) did not experience any sleep disturbance, whereas 24% said they did. Among the 126 participants, 61% reported engaging in regular weekly exercise, whereas 39% did not. Additionally, 96% of respondents claimed that they did not smoke, but 4% admitted to smoking daily. Regarding work-related variables, 69% had worked for more than ten years, and 31% had worked for less than ten years. Also, 91% of them worked for more than 6 hours a day.

Status and factors associated with musculoskeletal disorders among teachers
of selected schools of Pokhara Metropolitan City

Tripathi et al.

Table 1. Sociodemographic, Behavioral, and Work-related variables

Variables	Frequency (n=152)	Percent (%)
Sociodemographic variables		
Age		
18-35	56	44
36-55	63	50
Over 55 years	7	6
Gender		
Female	78	62
Male	48	38
Ethnicity		
Bhramin/Chhetris	101	80
Janajati	17	14
Dalits	8	6
Religion		
Hindu	117	93
Buddhist	7	5
Atheist	2	2
Educational status		
Intermediate	13	11
Bachelor	56	44
Master	57	45
Body Mass Index		
Underweight	2	1
Normal	60	48
Overweight	48	38
Obese	16	13
Behavioral variables		
Sleep disturbance		
Yes	30	24
No	96	76
Regular Exercise		
Yes	77	61
No	49	39
Smoke Habit		
Yes	6	4
No	120	96
Work-related variables		
Work experience		
Less than 10 years	39	31
More than 10 years	87	69
Daily working hour		
3 – 5 hours	12	9
6 hours and above	114	91
Daily standing hours		
1-2 hours	4	3
3 – 5 hours	64	51
6 hours and above	58	46
Teach in a head-down posture		
Yes	20	16
No	106	84

Status and factors associated with musculoskeletal disorders among teachers
of selected schools of Pokhara Metropolitan City

Tripathi et al.

Regarding standing, 51% stood for three to five hours, 46% for more than six hours, and 3% for one to two hours each day. Only 16% of respondents taught with their heads down, compared to 84% who did not.

Table 2 summarizes the prevalence of pain in various body parts over the past year. Out of the 126 respondents, 71% reported experiencing pain in at least one body part, while 29% did not. Pain was most commonly reported in the lower back (42%), followed by the shoulders (36%) and ankles/feet (32%). Pain in other areas, such as the neck, wrists/hands, and knees, ranged from 23% to 27%. The elbows and hips/thighs were the least affected areas, with pain prevalence of 13% and 16%, respectively.

Table 2. Pain in different body parts in the last 12 months (n=126)

Parts of the body where pain occurred	Yes	No
Neck	29(23%)	97(77%)
Shoulders	45(36%)	81(64%)
Elbows	16(13%)	110(87%)
Wrists/Hands	34(27%)	92(73%)
Upper Back	30(24%)	96(76%)
Lower Back	53(42%)	73(58%)
Hips/Thighs	20(16%)	106(84%)
Knees	30(24%)	96(76%)
Ankles/Feet	40(32%)	86(68%)

Table 3 highlights the respondents who experienced limitations in performing normal work due to pain in the past 12 months. Among the 89 respondents reporting pain, 63% indicated that the pain restricted their work activities, while 37% stated it did not. The lower back (59%) and shoulders (52%) were the most common areas where pain significantly impacted work performance. Other areas such as the wrists/hands (44%) and ankles/feet (38%) also had notable effects, whereas the hips/thighs and elbows had relatively lower impacts.

Table 3. Work limitations due to pain

Parts of the body where pain occurred	Yes	No
Neck	17(30%)	39(70%)
Shoulders	29(52%)	27(48%)
Elbows	9(16%)	47(84%)
Wrists/Hands	25(44%)	31(56%)
Upper Back	16(29%)	40(71%)
Lower Back	33(59%)	33(41%)
Hips/Thighs	10(18%)	46(82%)
Knees	18(32%)	38(68%)
Ankles/Feet	21(38%)	35(62%)

Table 4 provides data on pain experienced in the last week among the 89 respondents who reported pain. Over half (56%) experienced pain during this period, with the lower back and shoulders being the most frequently reported areas (52% each). Pain in other regions, such as the neck, wrists/hands, upper back, and knees, ranged between 14% and 30%.

Status and factors associated with musculoskeletal disorders among teachers
of selected schools of Pokhara Metropolitan City

Tripathi et al.

Table 4. Pain in the last week

Parts of the body where pain occurred	Yes	No
Neck	15(30%)	35(70%)
Shoulders	26(52%)	24(48%)
Elbows	7(14%)	43(86%)
Wrists/Hands	14(28%)	36(72%)
Upper Back	14(28%)	36(72%)
Lower Back	26(52%)	24(48%)
Hips/Thighs	9(18%)	41(82%)
Knees	15(30%)	35(70%)
Ankles/Feet	19(38%)	31(62%)

Table 5 reveals that there exists a statistically significant relationship between sex factors and Musculoskeletal Disorders, with a calculated p-value less than 0.05(p=0.001). However, there is no significant relationship found between age, ethnicity, religion, education, or BMI and Musculoskeletal Disorders, as indicated by p-values exceeding 0.05. These findings suggest that while sex may be a factor influencing Musculoskeletal Disorders, other demographic factors such as age, ethnicity, religion, education, and BMI do not appear to have a significant association with these disorders based on the provided data. With a p-value less than 0.05(p=0.027), the above table indicates a significant relationship between musculoskeletal disorders and sleep disturbances. However, since both exercise(p=1.098) and smoking habit(p=0.827) have p-values greater than 0.05, it is evident that there is no clear relationship between exercise, smoking habit, and musculoskeletal disorders. Given that the p-value in the above table is greater than 0.05, it can be concluded that there is no significant relationship between work experience and musculoskeletal disorders. Similarly, since all of the p-values for daily working hours, standing time, and teaching posture are greater than 0.05, it seems that none of these factors are related to musculoskeletal disorders.

Table 5. Association of sociodemographic, behavioral and work-related variables with musculoskeletal disorders

Variables	MSDS		Total	Crude odds ratio (95%CI)	P-value
	Present	Absent	(n=152)		
Sociodemographic Variables					
Age 18-35	36	20	56	1	0.311
36-55	47	16	63	1.63(0.740-3.590)	
Over 55	6	1	7	3.33(0.37-29.68)	
Gender Male	26	22	48	3.554(1.597-7.906)	0.001
Female	63	15	78	1	
Ethnicity					
Brahmin/ Chhetri	72	29	101	1.168(0.454-3.004)	0.747
Other than Brahmin/Chhetri	17	8	25	1	
Religion					
Hindu	82	35	117	0.702(0.626-0.787)	0.654
Other than Hindu	7	2	9	1	
Educational status					
Intermediate	10	3	13	1.940(0.480-7.870)	0.246

Status and factors associated with musculoskeletal disorders among teachers
of selected schools of Pokhara Metropolitan City

Tripathi et al.

Variables	MSDS	Total (n=152)	Crude odds ratio (95%CI)	P-value
Bachelor	43	13	56	1.93(0.850-4.390)	
Master	36	21	57	1	
Body Mass Index					
Normal	38	22	60	1.682(0.740-3.824)	0.086
Deviation from normal	51	15	66	1	
Behavioral variables					
Sleep disturbance					
Yes	26	4	30	0.294(0.095-0.913)	0.027
No	63	33	96	1	
Regular Exercise					
Yes	57	20	77	0.660(0.303-1.438)	1.098
No	32	17	49	1	
Smoke Habit					
Yes	4	2	6	0.828(0.073-9.416)	0.827
No	85	35	120	1	
Work-related variables					
Regular Exercise					
Yes	57	20	77	0.660(0.303-1.438)	1.098
No	32	17	49	1	
Work experience					
Less than 10 years	27	12	39	1.102(0.484-2.511)	0.817
More than 10 years	62	25	87	1	
Daily working hour					
Less than 6 hours	9	3	12	0.784(0.200-3.077)	0.727
6 hours and more	80	34	114	1	
Daily standing hour					
Less than 6 hours	48	20	68	1.455(1.233-1.716)	1.773
6 hours and more	41	17	58	1	
Teach in a head-down posture					
Yes	15	5	20	0.771(0.258-2.301)	0.640
No	74	32	106	1	

4. DISCUSSION

This study aimed to assess the prevalence and factors associated with musculoskeletal disorders (MSDs) among teachers in Pokhara Metropolitan City. The findings indicate a high prevalence of MSDs among teachers, with 71% reporting pain in at least one body part over the past 12 months. The most commonly affected body parts were the lower back, shoulders, and ankles/feet. These findings are consistent with other studies that have identified similar body areas as commonly affected in teaching professionals (AlMaghlouth, Alserhani, Aldossary, Alabdulqader, & Al-Dhafer, 2022; Ndonye, Matara, & Muriithi, 2019).

The high prevalence of MSDs among teachers in Pokhara underscores the physical demands of the profession. Teaching often involves prolonged standing, sitting, and repetitive motions, all of which contribute to musculoskeletal strain. Teachers are also required to carry heavy materials and frequently adopt awkward postures, which can lead to discomfort and pain in specific body parts such as the lower back and shoulders (Alias, Karuppiah, How, & Perumal, 2020).

Gender was found to be significantly associated with MSDs, with female teachers reporting more musculoskeletal pain compared to their male counterparts. This finding

Status and factors associated with musculoskeletal disorders among teachers
of selected schools of Pokhara Metropolitan City

Tripathi et al.

could be explained by several factors. Female teachers may experience greater physical strain due to classroom responsibilities, such as managing young children or carrying educational materials. Additionally, hormonal changes throughout life stages such as pregnancy or menopause may increase susceptibility to musculoskeletal pain. Previous research has also indicated that females often experience higher stress levels, which can exacerbate pain perception and contribute to the development of MSDs (Mohan, Justine, Jagannathan, Aminudin, & Johari, 2015; Erick & Smith, 2015).

The study also identified sleep disturbances as a significant behavioral factor associated with MSDs. Poor sleep quality can lead to muscle tension and reduced tissue repair, both of which may contribute to the development or worsening of MSDs. Teachers, due to the stress and demands of the profession, may be particularly vulnerable to sleep disturbances, which in turn affects their musculoskeletal health. Addressing sleep quality through health and wellness programs could potentially alleviate some of the musculoskeletal issues faced by educators (Erick & Smith, 2015).

In contrast, other behavioral factors such as smoking and exercise did not show significant associations with MSDs in this study. This finding is in line with some previous research but may reflect the specific characteristics of the study population, where other factors may be more influential in MSD development (Erick & Smith, 2015).

Interestingly, work-related factors such as work experience, daily working hours, standing hours, and teaching posture did not show significant associations with MSD prevalence. This finding suggests that while these factors are often cited as contributing to MSDs, their impact may vary depending on regional practices and the specific conditions of the teaching environment. It is possible that in Pokhara, schools have implemented some ergonomic interventions, or teaching practices might differ in a way that reduces the risk of musculoskeletal strain (Chand, Roomi, Begum, & Mudassar, 2020; Darwish & Al-Zuhair, 2013).

Overall, the high prevalence of MSDs among teachers in Pokhara Metropolitan City highlights the need for targeted interventions. Ergonomic assessments, the provision of ergonomic furniture, and promoting regular physical activity could help reduce the burden of MSDs among educators. Additionally, addressing factors such as sleep disturbances and creating a supportive work environment could further improve teacher health and well-being. Implementing these strategies could lead to better job satisfaction, improved productivity, and higher retention rates within the teaching profession (AlMaghlouth et al., 2022; Ndonye et al., 2019).

However, there are several limitations to this study. The cross-sectional design limits the ability to draw causal conclusions, and future research using longitudinal or intervention-based studies could provide more insights into the causes of MSDs and the effectiveness of preventive measures. Additionally, the reliance on self-reported data introduces the possibility of recall bias, although the use of a validated instrument such as the Nordic Musculoskeletal Questionnaire helps minimize this limitation.

5. CONCLUSION

This study found a high prevalence of musculoskeletal disorders (MSDs) among teachers in Pokhara, with 71% reporting pain, especially in the lower back, shoulders, and ankles/feet. Female teachers and those with sleep disturbances were more likely to report MSDs. These findings highlight the need for ergonomic interventions, such as better seating and regular breaks, as well as policies to improve teacher health through wellness programs. Addressing both physical and behavioral factors can reduce MSDs, improve teacher well-being, and enhance job satisfaction and retention. Further research on effective interventions is recommended.

Review Board Statement: Ethical approval (Ref no 04/080-081) for this study was obtained from Ethical Review Board of Modern Technical College.

Informed Consent Statement: Informed consent was obtained from all participants involved in this study.

Status and factors associated with musculoskeletal disorders among teachers
of selected schools of Pokhara Metropolitan City

Tripathi et al.

Conflict of Interest: The author declares no conflict of interest.

All the authors read and approved the final manuscript.

REFERENCES

Alias, A. N., Karuppiah, K., How, V., & Perumal, V. (2020). Prevalence of musculoskeletal disorders (MSDS) among primary school female teachers in Terengganu, Malaysia. *International Journal of Industrial Ergonomics*, *77*, 102957.DOI:10.1016/j.ergon.2020.102957

AlMaghlouth, M. K., Alserhani, N. M., Aldossary, F. A., Alabdulqader, M. A., & Al-Dhafer, B. A. (2022). Prevalence, Patterns, and Risk Factors of Work-Related Musculoskeletal Diseases Among Teachers in the Eastern Province, Saudi Arabia: A Community-Based Retrospective Cross-Sectional Survey. *Cureus*,*14*(12). DOI: 10.7759/cureus.32178

Althomali, O. W., Amin, J., Alghamdi, W., & Shaik, D. H. (2021). Prevalence and factors associated with musculoskeletal disorders among secondary schoolteachers in Hail, Saudi Arabia: A cross-sectional survey. *International Journal of Environmental Research and Public Health*, *18*(12), 6632. DOI: 10.3390/ijerph18126632

Amit, L. M., & T MALABARBAS, G. (2020). Prevalence and risk-factors of musculoskeletal disorders among provincial high school teachers in the Philippines. *Journal of UOEH*, *42*(2), 151–160. DOI: 10.7888/juoeh.42.151

Bhattarai, P., Bashistha, M., & Acharya, I. P. (2019). Study on Occupational Health Status of Secondary Level Teachers Teaching in Government School of Kathmandu District. *Journal of Training and Development*, *4*, 74–82. DOI: https://doi.org/10.3126/jtd.v4i0.26839

Chand, R. K., Roomi, M. A., Begum, S., & Mudassar, A. (2020). Prevalence of musculoskeletal disorders, associated risk factors and coping strategies among secondary school teachers in Fiji. *Rawal Medical Journal*, *45*(2), 377–381.

Darwish, M. A., & Al-Zuhair, S. Z. (2013). Musculoskeletal Pain Disorders among Secondary School Saudi Female Teachers. *Pain Research & Treatment*. DOI: 10.1155/2013/878570

Erick, P. N., & Smith, D. R. (2015). Musculoskeletal disorders in the teaching profession: An emerging workplace hazard with significant repercussions for developing countries. *Industrial Health*, *53*(4), 385–386. DOI: 10.2486/indhealth.2014-0218

Mohan, V., Justine, M., Jagannathan, M., Aminudin, S. B., & Johari, S. H. B. (2015). Preliminary study of the patterns and physical risk factors of work-related musculoskeletal disorders among academicians in a higher learning institute. *Journal of Orthopaedic Science*, *20*(2), 410–417. DOI: 10.1007/s00776-014-0682-4

Ndonye, N. A., Matara, N. J., & Muriithi, I. A. (2019). Predictors of work-related musculoskeletal disorders among primary school teachers in Machakos County, Kenya. *Int. J. Ind. Ergon*. DOI: 10.5923/j.ijpt.20190802.01

Ng, Y. M., Voo, P., & Maakip, I. (2019). Psychosocial factors, depression, and musculoskeletal disorders among teachers. *BMC Public Health*, *19*, 1–10. DOI: https://doi.org/10.1186/s12889-019-6553-3

Ojukwu, C. P., Anyanwu, G. E., Eze, B., Chukwu, S. C., Onuchukwu, C. L., & Anekwu, E. M. (2021). Prevalence, pattern and correlates of work-related musculoskeletal disorders among school teachers in Enugu, Nigeria. *International Journal of Occupational Safety and Ergonomics*, *27*(1), 267–277. DOI: 10.1080/10803548.2018.1495899