

Preservice Teachers' Mindfulness and Attitudes Toward Students With Autism Spectrum Disorder: The Role of Basic Psychological Needs Satisfaction

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Teachers' attitudes toward students with autism spectrum disorder (ASD) are vital predictors of successful inclusive education. Guided by the basic psychological needs theory, this cross-sectional survey aimed to examine the relationships among mindfulness, basic psychological needs satisfaction (basic psychological needs theory-based construct), and attitudes toward including students with ASD among preservice physical education (PE) teachers. A multisection survey form was administered to 211 preservice PE teachers. Path analysis indicated that mindfulness and basic psychological needs satisfaction positively predicted attitudes toward the inclusion of students with ASD. In addition, mindfulness had an indirect effect on attitudes through basic psychological needs satisfaction. The findings provide a preliminary direction for the development of a mindfulness-based intervention program for enhancing preservice PE teachers' attitudes toward the inclusion of students with ASD. The findings also suggest that the basic psychological needs theory is a useful framework for understanding the relationship between mindfulness and attitudes. Future longitudinal or intervention studies are needed to examine whether the findings can be replicated.

Keywords: awareness, disability, inclusive education, physical educator

Autism spectrum disorder (ASD) is a neurodevelopmental disorder presenting as impaired social interaction and restricted and repetitive behaviors ([American Psychiatric Association, 2013](#)). In Hong Kong, about 1.2% of students in

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mainstream primary schools are diagnosed with mild-to-moderate ASD (Hong Kong Education Bureau, 2016), which is similar to the overall prevalence of ASD in developed countries (Centers for Disease Control and Prevention, 2014; Taylor, Jick, & Maclaughlin, 2013). Students with ASD in Hong Kong may attend either special or mainstream schools. In general, those with an intelligence quotient (IQ) score below 70 are required to study at special schools, whereas the rest study in mainstream schools (Hong Kong Education Bureau, 2014). As the incidence of ASD in Hong Kong is rising, it is likely that increasing number of children with ASD will be participating in inclusive physical education (PE; Li, Wang, Block, Sum, & Wu, 2018). Research has shown that successful participation in inclusive PE is critical for students with ASD to acquire developmentally appropriate social, communicative, and behavioral outcomes (Lang et al., 2010).

Teachers' Attitudes

Physical education teachers' attitudes toward including students with ASD play a critical role in the success of inclusive PE (Healy, Msetfi, & Gallagher, 2013). An attitude refers to an individual's tendency to favor or disfavor while assessing a particular entity, such as including students with ASD in PE (Eagly & Chaiken, 2007). Physical educators with positive teaching attitudes benefit students with ASD by helping them improve their motor and social skills development (Park & Chitiyo, 2011; Taliaferro, Hammond, & Wyant, 2015). By contrast, PE teachers' unfavorable attitudes toward students with ASD may have negative effects (Park, Chitiyo, & Choi, 2010). PE teachers' negative attitudes have been identified as a barrier for promoting learning of students with and without ASD and the inclusive movement (Block & Obrusnikova, 2007; Li, Chen, & Zhang, 2010). Unfortunately, many preservice and in-service PE teachers have concerns about and hold negative attitudes toward the inclusion of students with ASD (Block, Hutzler, Barak, & Klavina, 2013; Wilhelmssen & Sørensen, 2017).

Negative attitudes may be difficult to resolve, in part because of the basic underlying cognitive processes. Attitudes can be formed through past experiences and influenced by the presence of certain objects and environments, such as people, organizations, and social trends (Shank, 2002). Teachers' attitudes toward including students with ASD can be influenced by factors such as contact with and knowledge about such students (Low, Lee, & Ahmad, 2018; Park et al., 2010). Teachers with more contact and knowledge about students with ASD tend to have more positive attitudes toward them (Prelock, 2006; Taliaferro et al., 2015). Finally, certain demographic variables can account for teachers' attitudes; for instance, females generally hold more favorable attitudes than males toward the inclusion of students with ASD (Park & Chitiyo, 2011). In addition to these factors, it is possible that mindfulness can explain the formation of teachers' attitudes toward the inclusion of students with ASD, yet this area is largely unexplored.

Mindfulness and Attitudes

Mindfulness refers to a receptive attention to and awareness of present events and experience (Brown & Ryan, 2003) and is a vital factor in forming and changing

attitudes (Palmerino, Langer, & McGillis, 1984; Shapiro, Carlson, Astin, & Freedman, 2006). Mindful people are prone to engage in a state of broadened attention and increased psychological flexibility. This allows them to consider mental events (e.g., observing the stereotypical behavior of a student with ASD) as transient moments, which reduces the natural tendency toward negative evaluations and emotional reactions (Schultz, Ryan, Niemiec, Legate, & Williams, 2015). As such, mindfulness is associated with less negative appraisals and may lead to healthy functioning by softening the impact of negative stimuli (Schultz et al., 2015). Early studies found positive associations between mindfulness and psychological outcomes such as empathy (Beitel, Ferrer, & Cecero, 2005); mental health (Brown, Ryan, & Creswell, 2007); unbiased intergroup relations (Tincher, Lebois, & Barsalou, 2016); and unprejudiced thinking (Lillis & Hayes, 2007). Thus, it is expected that PE teachers with a high level of mindfulness tend to make few or no negative judgments on communication problems and challenge behaviors of students with ASD (e.g., rigid language and body rocking) and thus are likely to have a favorable evaluation about inclusion of students with ASD. However, there is a dearth of studies investigating the relationship between mindfulness and attitudes toward the inclusion of students with ASD.

The Role of Basic Psychological Needs Satisfaction

It is important to understand the underlying process between mindfulness and attitudes toward students with ASD. One possible and promising approach is to use the basic psychological needs theory (BPNT; Deci & Ryan, 2000). This theory posits the existence of three basic psychological human needs: autonomy (i.e., the need to experience volition and choice); competence (i.e., the need to feel competent and to accomplish goals); and relatedness (i.e., the need to experience interpersonal connection and caring; Deci & Ryan, 2000). The open and receptive awareness that characterizes mindfulness is likely to facilitate attention to people's internal world and psychological functioning, which, in turn, helps them to act in a way that fulfills their basic psychological needs (Schultz & Ryan, 2014). In general, mindfulness has been shown to be positively associated with needs satisfaction (e.g., Brown & Ryan, 2003; Campbell et al., 2015). However, the link has not been examined in the inclusive PE setting. In this setting, mindful PE teachers may fulfill their need of autonomy through focusing on what is occurring in the moment, which may lead them to make meaningful choices and act. In addition, engaging in the present moment is likely to help PE teachers to focus on their teaching tasks rather than judge their teaching outcomes (e.g., little improvement of physical fitness level in students with ASD). Finally, mindful PE teachers may have a tendency to view social communication problems of students with ASD less defensive, enabling them to experience interpersonal connections with this special group.

BPNT (Deci & Ryan, 2000) also posits that the satisfaction of these basic psychological needs is essential for positive human growth and functioning (e.g., life satisfaction and vitality). By contrast, failure to meet these needs can result in psychological maladjustment or even psychopathology such as

aggression and depression (Vansteenkiste & Ryan, 2013). Past research has consistently shown that the three basic psychological needs predict affective, behavioral, and cognitive outcomes (Deci & Ryan, 2000; Vallerand, 2007). For example, needs satisfaction has been found to influence attitudes toward sport continuation (Gucciardi & Jackson, 2015) and Islam (Ghorbani, Watson, Geranmayepour, & Chen, 2014). To this end, we expected the satisfaction of basic psychological needs to predict positive attitudes toward students with ASD among PE teachers. When PE teachers' basic psychological needs are satisfied, they are expected to feel adequate control and independence of their life (i.e., instrumental attitudes); perceive the capability to cope with life challenges (i.e., behavioral attitudes); and have strong feelings and emotional connections with other people (i.e., affective attitudes). However, there is a lack of direct empirical evidence regarding the link between needs satisfaction and attitudes in the inclusive PE setting.

Aims and Hypotheses

This study aimed to investigate the relationships among mindfulness, basic psychological needs satisfaction, and attitudes toward including students with ASD among preservice PE teachers (i.e., the model depicted in Figure 1). Preservice PE teachers were recruited in this study as the corresponding findings may inform practitioners to develop preservice teacher education programs. According to our literature review, we hypothesized that mindfulness and basic psychological needs satisfaction would positively predict teachers' attitudes toward the inclusion of students with ASD (Hypotheses 1 and 2; e.g., Ghorbani et al., 2014; Schultz & Ryan, 2014; Tincher et al., 2016). We also hypothesized that mindfulness would have an indirect effect on attitudes through basic psychological needs satisfaction (Hypothesis 3; e.g., Campbell et al., 2015; Vansteenkiste & Ryan, 2013).

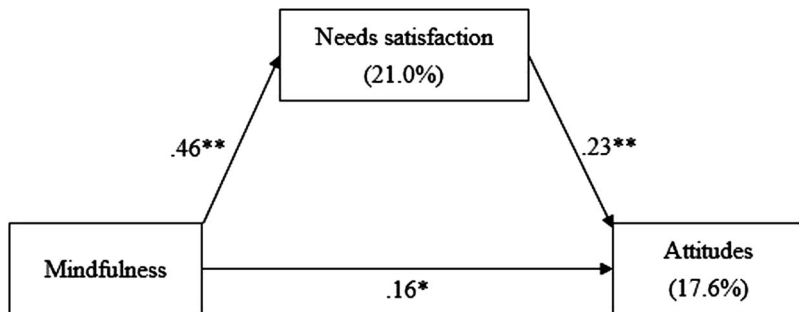


Figure 1 — Standardized path estimates for the relationships among mindfulness, basic psychological needs satisfaction, and attitudes toward students with autism spectrum disorder. For clarity, controlling variables (i.e., social desirability and year of study) and disturbances are omitted. * $p < .05$. ** $p < .01$.

Method

Participants

There are only two PE teacher education programs in Hong Kong. It takes preservice PE teachers 5 years to complete their training. The preservice PE teachers are required to take courses related to their major (including one course about introduction to adapted PE), education studies, general education, field experience of PE in general schools (7 weeks in Year 3 and another 7 weeks in Year 5), and honors project. Upon graduation, they can automatically register as a PE teacher in local schools. A sample of preservice PE teachers ($n = 211$) was recruited from these two programs. The proportion of female and male participants was generally balanced (female = 45%; male = 55%). The participants were from different year groups (Year 1 = 42, Year 2 = 42, Year 3 = 50, Year 4 = 39, and Year 5 = 38). Their ages ranged from 18 to 26 years ($M = 20.83$, $SD = 1.84$).

Measures

Four major study variables—mindfulness, basic psychological needs satisfaction, attitudes toward including students with ASD, and social desirability—were measured using standardized scales together with three demographic questions (i.e., age, gender, and year of study).

Mindfulness. The validated Chinese version of the 20-item Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Hou, Wong, Lo, Mak, & Ma, 2014) was used to measure participants' dispositional mindfulness. The questionnaire included five 4-item subscales: observing (e.g., "I pay attention to sensations, such as the wind in my hair or sun on my face"); describing (e.g., "I'm good at finding words to describe my feelings"); acting with awareness (e.g., "When I do things, my mind wanders off and I'm easily distracted"); nonjudging (e.g., "I tell myself I shouldn't be feeling the way I'm feeling"); and nonreactivity (e.g., "When I have distressing thoughts or images, I 'step back' and am aware of the thought or image without getting taken over by it"). Participants were asked to rate each item on a 5-point Likert scale, ranging from 1 (*never*) to 5 (*always*). We dropped the nonreactivity subscale because it showed poor internal reliability in our sample ($\alpha = .54$). The remaining subscales were found to have acceptable internal reliability (observing: $\alpha = .76$, describing: $\alpha = .81$, acting with awareness: $\alpha = .85$, nonjudging: $\alpha = .71$, and overall: $\alpha = .67$). A total scale score was calculated by averaging the item scores for the four subscales for subsequent analyses. Higher scores indicated higher levels of mindfulness.

Basic Psychological Needs Satisfaction. The validated Chinese version of the Basic Psychological Needs Satisfaction and Frustration Scale was used to assess participants' basic psychological needs satisfaction in life (Chen et al., 2015). For the purpose of this study, three 4-item subscales tapping into autonomy (e.g., "I feel a sense of choice and freedom in the things I undertake"); competence (e.g., "I feel confident that I can do things well"); and relatedness (e.g., "I feel that the people I care about also care about me") satisfaction were adopted. All items were rated on a 5-point Likert scale, ranging from 1 (*not true at all*) to 5 (*completely true*). In our

sample, the three subscales showed acceptable to good reliability (autonomy: $\alpha = .69$, relatedness: $\alpha = .69$, competence: $\alpha = .78$, and total satisfaction: $\alpha = .84$). For the sake of model parsimony and in line with earlier research (e.g., Campbell et al., 2015; Li, Wang, & Pyun, 2017), an overall basic psychological needs satisfaction score was calculated by averaging all of the subscale items for testing the hypothesized model (see Figure 1). Indeed, different analytical approaches have their own advantages and disadvantages (see Brunet, Gunnell, Teixeira, Sabiston, & Bélanger, 2016). For those who are interested in examining the role of each subscale score or overall and subscale scores simultaneously in the model (e.g., Brunet et al., 2016), data will be available from the corresponding author upon request.

Attitude. A 3-item scale was used to evaluate physical educators' attitudes toward including students with ASD (Beamer & Yun, 2014). The original English scale was translated into Chinese by two Chinese–English linguists. Back-translation was then performed to ensure the translation quality (Brislin, 1970). Participants were asked to complete the statement, “Teaching students with ASD in my class would be. . .” using three 7-point semantic differential scales (from *extremely harmful* to *extremely beneficial*, from *extremely bad* to *extremely good*, and from *extremely worthless* to *extremely useful*). Mean scores were calculated based on the responses to the three items. The scale demonstrated good reliability in the current sample ($\alpha = .87$).

Social Desirability. To account for the social desirability bias, in particular to the responses to the attitude scale, the 13-item Chinese Marlowe–Crowne Social Desirability Scale (Reynolds, 1982; Wei, Han, Zhang, Sun, & Zhang, 2015) was used to assess participants' social desirability. The scale showed adequate psychometric properties among Chinese middle school students (see Wei et al., 2015). Participants needed to respond either Yes (1) or No (0) to the statements (e.g., “I sometimes feel resentful when I don't get my way”). The final score was obtained by summing up all scores for each statement. A higher score indicates a greater level of social desirability. Acceptable internal reliability was observed in this study ($\alpha = .65$).

Procedure

The principal investigator obtained ethical clearance for the study from the institutional review board of the Education University of Hong Kong before data collection. Course lecturers were approached to invite their students to participate in this survey. A total of 233 preservice PE teachers were invited, and 211 of them completed the survey (response rate = 90.6%). Participants provided informed consent before filling in the questionnaires. All data were collected in quiet classrooms under the supervision of the course lecturer and a research assistant from September to October 2017. The survey form started with several demographic questions, followed by questions related to mindfulness, basic psychological needs satisfaction, attitudes, and social desirability. The whole survey took no more than 20 min to complete.

Data Analysis

The skewness and kurtosis values of item responses ranged between -2.00 and 2.00 (Tabachnick & Fidell, 2013). No univariate outliers were identified as the z scores of the item responses were within the range of -4.00 and 4.00 (Hair, Black,

Babin, & Anderson, 2010). The Mahalanobis distance did not indicate any multivariate outliers ($p > .001$; Hair et al., 2010). There were 22 missing item responses to the standardized scales, and we handled the missing values through a single imputation using an expectation–maximization algorithm, $\chi^2(629) = 629.30, p = .49$ (Little, 1998). The means, *SDs*, internal reliability, and zero-order correlations of the study variables were computed after cleaning the data. All these statistical analyses were performed with IBM SPSS Statistics (version 21.0; IBM, Armonk, NY).

Path analyses were conducted to test the proposed model (see Figure 1) and Hypotheses 1–2 in IBM SPSS Amos 21 (IBM, Armonk, NY). The maximum likelihood estimation procedure was employed. Several fit indices were used to evaluate the model fit, including χ^2 to degree of freedom ratio (χ^2/df), comparative fit index, and root-mean-square error of approximation. According to Kline (2005), a value of χ^2/df smaller than 3.0, a comparative fit index value greater than .90, and a root mean square error of approximation value lower than .08 indicated adequate fit. Finally, a bootstrap estimation approach was conducted to test the indirect effect of basic psychological needs satisfaction on the relationship between mindfulness and attitudes (Hypothesis 3). The 95% bias-corrected accelerated confidence intervals were generated by bootstrapping with 5,000 samples (Hayes, 2012).

Results

Descriptive Statistics and Zero-Order Correlations

The descriptive statistics and zero-order correlations are shown in Table 1. The participants reported moderate levels of mindfulness, basic psychological needs satisfaction, attitudes toward students with ASD, and social desirability. Age and year of study (coded as 1 = Year 1, 2 = Year 2, 3 = Year 3, 4 = Year 4, and 5 = Year 5) were negatively associated with attitudes ($r = -.18/- .28$, all $ps < .001$). Furthermore, mindfulness was positively related to needs satisfaction ($r = .46, p < .001$).

Table 1 Descriptive Statistics, Internal Reliability, and Zero-Order Correlations of Study Variables ($N = 211$)

	α	Range	M (SD)	1	2	3	4	5	6
Age	—	18–26	20.83 (1.84)	—					
Gender	—	—	—	.21**	—				
Year of study	—	—	2.95 (1.38)	.73**	.24**	—			
Mindfulness	.67	1–5	3.15 (0.34)	.01	.04	–.06	—		
Needs satisfaction	.84	1–5	3.73 (0.45)	.02	–.01	–.04	.46**	—	
Attitudes	.87	1–7	4.45 (0.95)	–.18**	–.02	–.26**	.30**	.32**	—
Social desirability	.65	0–13	6.75 (2.71)	–.24**	–.09	–.28**	.28**	.22**	.25**

** $p < .01$.

and attitudes toward students with ASD ($r = .30, p < .01$). Finally, there was a positive relationship between attitudes toward students with ASD and social desirability ($r = .25, p < .001$). These findings suggested the need to control the effects of age, year of study, and social desirability when testing the proposed model.

As age and year of study was highly correlated ($r = .73, p < .001$) and year of study had a stronger association with attitudes than age, age was not controlled in the model. Specifically, a direct path from year of study/social desirability to attitudes was added in the path model based on our results and previous research (e.g., Low et al., 2018; Taliaferro et al., 2015), and these controlling variables were allowed to correlated with mindfulness and each other. We also conducted an additional analysis to examine the difference of attitudes by year of study. The result of one-way analysis of variance showed that there was a group difference on attitudes, $F(4, 206) = 5.10, p = .001$, partial $\eta^2 = .09$. The results of multiple comparison using Bonferroni adjustments indicated that Years 1–3 students ($M_s = 4.57$ – $4.73, SD_s = 0.83$ – 1.06) had more positive attitudes than that of Years 4–5 students ($M_s = 4.03$ – $4.15, SD_s = 0.84$ – 0.87 ; all $p_s < .05$).

Path Analysis

The findings of the path analysis supported the proposed model, $\chi^2(2) = 3.17, \chi^2/df = 1.59$, comparative fit index = .990, root-mean-square error of approximation = .053. Figure 1 illustrates the standardized path estimates among mindfulness, needs satisfaction, and attitudes toward students with ASD. In line with the zero-order correlation results and Hypotheses 1–2, both mindfulness ($\beta = 0.16, p = .04$) and needs satisfaction ($\beta = 0.23, p = .001$) positively predicted attitudes. According to Cohen (1992), these two predictors showed a small to moderate effect on attitudes.

Table 2 presents the standardized direct, indirect, and the total effects of the model. The meditation analysis with bootstrapping showed that mindfulness had

Table 2 Results of Mediation Analysis ($n = 211$)

Effect	β	p	95% BCa CI
Direct effects			
mindfulness \rightarrow needs satisfaction	0.46	<.001	[0.33, 0.57]
needs satisfaction \rightarrow attitudes	0.23	.001	[0.09, 0.36]
mindfulness \rightarrow attitudes	0.16	.04	[0.01, 0.30]
age \rightarrow attitudes	-0.16	.01	[-0.03, -0.28]
social desirability \rightarrow attitudes	0.12	.08	[-0.02, 0.26]
Indirect effects			
mindfulness \rightarrow needs satisfaction \rightarrow attitudes	0.11	<.001	[0.04, 0.18]
Total effects			
mindfulness \rightarrow attitudes	0.26	<.001	[0.13, 0.39]

Note. β = standardized parameter estimate; BCa CI = bias-corrected accelerated confidence interval.

an indirect effect on attitudes via needs satisfaction ($\beta = 0.11$, $SE = 0.03$, 95% bias-corrected accelerated confidence interval [0.04, 0.18]). Thus, Hypothesis 3 was supported. All the predictors explained 17.6% of the total variance in attitudes, which can be interpreted as a moderate effect (Cohen, 1992).

Discussion

The present study examined the relationships among mindfulness, basic psychological needs satisfaction, and attitudes toward students with ASD among preservice PE teachers. The findings showed that mindfulness and basic psychological needs satisfaction positively predicted physical educators' attitudes toward students with ASD. Furthermore, mindfulness showed an indirect effect on attitudes via needs satisfaction.

Previous studies have examined various factors such as contact, knowledge, and demographic variables (e.g., gender) as predictors of teachers' attitudes toward the inclusion of students with ASD (e.g., Low et al., 2018; Park & Chitiyo, 2011; Park et al., 2010; Wilhelmsen & Sørensen, 2017). These predictors are generally found to contribute to the formation of attitudes. In the present study, year of study was found to negatively predict attitudes, and Years 1–3 students possessed more positive attitudes than that of Years 4–5 students. As our participants' teaching practicum is usually scheduled during senior years, negative internship experiences when including students with ASD in PE may contribute to the formation of unfavorable attitudes (Shank, 2002). The negative teaching experiences might be attributed to the lack of quality training in adapted PE (Tant & Watelain, 2016). To the best of our knowledge, current PE teacher training programs in Hong Kong provide limited training on how to include students with ASD in PE.

One significant contribution of this study is that we further explored the formation of attitudes by including mindfulness and that we found a positive relationship between mindfulness and attitudes in the inclusive PE setting. Teachers' attitudes toward students with ASD are formed based on their evaluation and emotional reaction to the presence of students with ASD and their past teaching experience (Shank, 2002). Indeed, mindfulness is considered a vital factor in the formation of attitudes (Shapiro et al., 2006). It is a psychological skill that enables teachers to pay attention to the presence of students with ASD without making judgments and to handle negative feelings and emotional reactions (Kashdan & Ciarrochi, 2013). To this end, mindfulness may help PE teachers to reduce the natural tendency toward negative evaluations and emotional reactions when teaching students with ASD (Schultz et al., 2015).

Another significant contribution of this study is that we investigated the role of needs satisfaction in the relationship between mindfulness and attitudes. In line with our prediction, mindfulness had an indirect effect on attitudes via basic psychological needs satisfaction. Indeed, early research suggests that mindfulness may not directly lead to attitudes. Instead, there are certain underlying processes that might act as indirect factors, such as the number of psychological symptoms, the level of perceived stress, and rumination (Borders, Earleywine, & Jajodia, 2010; Carmody & Baer, 2008). Our findings can be explained by considering previous research on the relationship between mindfulness and needs satisfaction.

The fulfillment of basic psychological needs can be promoted by the open and receptive awareness that characterizes mindfulness (Ryan, Huta, & Deci, 2008). For example, a PE teacher who is able to focus on the present is more aware of her internal and external world (e.g., inclusive PE classroom) and can subsequently help to change herself or her relationships with others (e.g., increased relatedness with students with ASD). Similarly, the fulfillment of the other two basic psychological needs, autonomy and competence, can be facilitated by mindfulness (Schultz & Ryan, 2014).

According to the BPNT (Deci & Ryan, 2000), satisfaction of basic psychological needs will predict affective, behavioral, and cognitive outcomes. Consistent with the tenet of BPNT and our hypothesis, basic psychological needs satisfaction was found to positively predict the selected outcome (i.e., attitudes toward including students with ASD). Similarly, Gucciardi and Jackson (2015) found that the fulfillment of basic psychological needs enhanced athletes' attitudes toward sport continuation. It seems that when PE teachers' basic psychological needs are satisfied, they will feel as though they have autonomy of their teaching behavior (i.e., instrumental attitudes); can deal with teaching challenges (i.e., behavioral attitudes); and are socially valued and connected (i.e., affective attitudes) in the inclusive PE setting (Deci & Ryan, 2000; Gucciardi & Jackson, 2015).

Limitations and Future Directions

The present study is subject to several limitations. First, the nonreactivity subscale in the FFMQ was dropped due to its poor reliability. This might be a sample-specific problem as the reliability of the Chinese-translated FFMQ, including all five subscales, was supported in an earlier study (Hou et al., 2014). In addition, internal consistency of the four-factor FFMQ ($\alpha = .67$) and Chinese Marlowe-Crowne Social Desirability Scale ($\alpha = .65$) was slightly below the traditional cutoff of .70. Thus, the relevant results should be interpreted with caution. Second, although the proposed model was formulated based on the BPNT (Deci & Ryan, 2000), the cross-sectional design of the study limited the casual inferences of the results. Longitudinal surveys or intervention studies should be used in future to support the current ordering and interpretation. Third, although the current study extended the literature by including mindfulness as a predictor of teachers' attitudes toward ASD after controlling factors such as social desirability, previous contact, and experience with students with ASD that might affect preservice teachers' attitudes were not measured and controlled in this research (e.g., Taliaferro & Harris, 2014; Taliaferro et al., 2015). A more comprehensive study is needed to examine other potential predictors of attitudes.

Practical Implications

From a practical perspective, the present findings suggest a pressing need to provide quality-adapted PE training for preservice PE teachers in Hong Kong (e.g., define a specific learning objective according to characteristics of students with ASD and modify a teaching strategy to achieve the objective). Furthermore, our findings provide a preliminary direction to develop a mindfulness-based intervention program for improving preservice PE teachers' attitudes toward

the inclusion of students with ASD. Mindfulness-based interventions have proven to be successful in targeting different illnesses and populations (e.g., stress reduction and substances abuse; Bowen et al., 2006; Shonin, Gordon, & Griffiths, 2013), suggesting the possibility of successfully developing an intervention for promoting preservice teachers' attitudes. If such a program could be developed and launched successfully, inclusive PE for students with ASD would be promoted in Hong Kong and beyond. However, more research (e.g., longitudinal and intervention studies) is needed to support and inform development of a mindfulness-based intervention to positively influence preservice PE teachers' inclusive attitudes toward students with ASD.

Conclusions

The present study provides some insight into preservice PE teachers' attitudes toward the inclusion of students with ASD, and we further examined the relationships among mindfulness, basic psychological needs satisfaction, and attitudes toward students with ASD. As expected, we found significant relationships among the studied variables, which can benefit current teacher training programs and pave the way for the development of a mindfulness-based intervention program. Nevertheless, investigations in this area are still at an early stage, and more research is needed.

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