Validity, reliability, and cross-validation of a new questionnaire developed using the Theory of Planned Behavior: The Dating Violence Bystander Help-giving Intention Questionnaire (DVBHIQ)

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ABSTRACT

The present study aimed to develop and psychometrically test a scale by using the Theory of Planned Behavior (TPB) comprising two types of measurement (direct and belief-based [indirect]) to assess bystander help-giving intention to victims of dating violence among youth. A two-phase, mixed-method design was adopted. The primary source of the samples was five universities, each in the northern, central, southern, eastern, and outer islands regions of Taiwan. Phase I involved developing an instrument based on the TPB (n = 10) and pilot testing (n = 220). Phase II conducted the psychometric evaluation (n = 622). The study used item analysis, explanatory factor analysis, confirmatory factor analysis, internal consistency, and cross-validation to examine the psychometric properties of the Dating Violence Bystander Help-giving Intention Questionnaire (DVBHIQ) with two types of measure (direct and belief-based). Explanatory factor analysis resulted in a four-factor solution (attitude/behavioral beliefs, subjective norms/normative beliefs, perceived behavioral control/control belief, and intention) of the direct and belief-based measures of the DVBHIQ, accounting for 72.67% and 76.62% of total variance respectively. Confirmatory factor analysis and cross-validation confirmed the proposed four-factor model and demonstrated good internal consistency reliability. The two types of DVBHIQ had good validity, reliability, and measurement invariance which may help address the core cognitive determinants for bystander help-giving intention. Healthcare providers (e.g., school nurses) could use the DVBHIQ to evaluate how bystander education programs affect youth and conduct related research in the future.

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1. Introduction

Dating violence (DV)—physical, emotional, and sexual violence committed by an intimate partner or ex-partner among unmarried young adults—is a significant and national public health problem and is prevalent on higher education campuses [1]. The results of previous research on different age groups have shown that university students are the group that has suffered the most from DV (20–30%) [2]. The impact on victims has been well documented, including adverse effects on their mental, physical, and sexual health and academic performance. Some victims experience severe injuries, unintended pregnancy [1], depression [3], suicidal thoughts or behavior [4], and even homicide [1]. Historically, DV prevention programs on university campuses have focused on changing the potential victims' actions and the perpetrators' education. More recently, a renewed effort to prevent such violence includes bystander intervention programs that encourage bystanders to intervene and approach safely when they hear or see conditions that could lead to violent behaviors [5,6]. While this is a suitable type of intervention, there is little literature on theory-driven and socio-cognitive determinants that influence bystander help-giving intention to victims of DV.

1.1. Background

DV is prevalent on university campuses, which has lifelong consequences on victims' mental and physical health and may lead to intimate partner violence (IPV) in adulthood [7]. The prevalence of DV among university-age male and female victims has ranged between 20% [8] and 43% [9], respectively. In Taiwan, 59% of university students (n = 601) reported experiencing DV in the past year [10]. Moreover, the recent dramatic increase in the use of online dating apps and websites has increased not only users' unsafe sexual behaviors but also their chances of being sexually abused [11]. The increase also shows that the problem of DV has extended to the internet. Moreover, frequent reports of DV incidents in school and self-injury by terrified partners led to Article 63-1 of Taiwan's Domestic Violence Prevention Law in 2015 that the survivors who experienced unlawful physical or mental violations may apply various protective measures of civil protection orders. In this regard, Taiwan's Ministry of Education implemented the "School DV Awareness and Prevention Education Program" in schools, but the interventions had a limited effect.

The perpetrators and the victims tend to downplay the problems of DV [12]. The victims of DV have a low willingness to seek help due to fear, stigma [13], and tolerance of intimate partner violence [14,15]. According to Shen's [10] study investigating university student strategies for dealing with DV in Taiwan, victims tend to deal with DV by themselves, such as talking to the abuser (69.4%), thinking more about their partners and the beauty of the relationship (55.9%), and patience (40.8%). When they seek help, only 5.2% seek help from school teachers or counselors, 3% seek police and legal assistance, and mainly seek help from friends (45.9%). This result is similar to countries such as the U.S., where 85.7% of DV victims told their friends first [16]. However, compared to U.S. universities, Chinese university students appear to have higher tolerance towards intimate partner violence (IPV) than their U.S. counterparts, who are affected primarily by their gender-role attitudes and perceptions of IPV causes [14]. For example, the beliefs of male dominance in Chinese culture may subject females to subordinate positions highly susceptible to IPV [14,15]. Cultural values and norms can influence individuals' acceptability of male violence against females and lead to victim-blaming attitudes and behaviors among Chinese people [14]. Fear of adverse reactions from others and revictimization in seeking help have been reported by Taiwanese female victims of DV when they were help-seeking [17]. Therefore, the attitude, subjective norms, and behavioral intentions of bystanders from whom victims of DV seek help are critical [18]. However, no previous research has ever explored the sociocultural factors that influence or determine bystanders' help-giving intentions toward victims of DV in Taiwan, especially from the perspective of young people. Therefore, the present study examined Taiwanese university students' cognition and socio-cultural determinants of bystanders' help-giving intention toward victims of DV to bridge this knowledge gap.

1.2. Theory of Planned Behavior

The Theory of Planned Behavior (TPB) is one of the most widely used frameworks in explaining health behaviors and their determinants [18–20] because it considers the interaction between personal and social factors in explaining behavior [19]. Based on the TPB's assumptions, the main predictor of behavior is the intention to change it. Intention is defined as an individual's motivation toward specific behavior, which is predicted by three determinants: attitude, subjective norms, and perceived behavioral control. Attitude is an individual's overall positive or negative evaluation of the behavior. Subjective norms (SNs) refer to an individual's perceptions of essential others' expectations of them in conducting or not conducting a behavior. Perceived behavioral control (PBC) is an individual's perception regarding how much control they have over behavior. PBC also encompasses the level of confidence and control perceived by an individual to perform a behavior [21], which may determine the behavioral intention and actual behavior [22].

Moreover, the TPB indicates that behavior is a function of intention to perform the specific behavior, which is influenced by an individual's salient beliefs, including behavioral beliefs (about the behavior and its outcomes), normative beliefs (about social expectations and motivation to comply with these expectations), and control beliefs (about the extent of control an individual has over executing the behavior) [23]. In turn, these salient beliefs affect attitudes, subjective norms, and perceived behavioral control. Overall, the more favorable attitude and subjective norms, and the greater the perceived behavioral control towards the particular behavior, the more significant the change should be in behavioral intention and the final behavior [19,21,23,24]. According to Ajzen and Fishbein [25] and Ajzen [26], psychometric scale development can be divided into direct measures (obtaining a general assessment or opinion of the individuals) and belief-based (indirect) measures (examining the individual's underlying specific beliefs and outcome evaluations) [21]. In order to design suitable interventions to increase bystander's help-giving behavior that can prevent or decrease

the prevalence of dating violence, it is important to have a better understanding of how personal and social factors interact and influence the bystander's help-giving intention and behavior. The TPB is an appropriate and well tested theory that can be used to explore the related factors of bystander's help-seeking behavior intention. The findings will help interventions to be tailored to individual needs in all situations (e.g., everyday situations vs. crises).

Several researchers have applied the TPB as the key theoretical framework for research concerning violence, including the attitudinal correlates of girls' use of violence in teen dating relationships [27], intention to perpetrate DV [28], prediction of DV [29], and cyberbullying [30,31]. Based on social cognitive theory, individual behavior is determined by the interaction with their cognition and environment [32]. Consequently, exploring the internal cognitive and sociocultural factors that affect young university students' help-giving intentions when facing DV victims is necessary. Moreover, most existing scales have focused on assessing bystander behaviors to prevent sexual assault or relationship violence [33,34]. However, bystander behaviors for sexual assault and DV differ according to risk markers [35]. Using the TPB can help in the development of a psychometric scale to obtain a general assessment or opinion of the bystander, as well as examining the bystander's underlying specific beliefs and outcome evaluations.

Only one scale (i.e., the Bystander Behavior Intentions-Friends Scale) assesses bystander behavior intentions to prevent DV [36]. However, this scale is not theory-driven and is only used for friends. Therefore, the present paper attempted to fill these critical gaps in the literature by developing and validating a TPB-based instrument to investigate bystander help-giving intention toward individuals suffering from DV and its determinants among Taiwanese university students. Assessing bystander help-giving intention has substantial implications for understanding correlates (e.g., attitude, SN, and PBC) and outcomes (e.g., help-giving intention) in the Taiwanese context.

Moreover, a group of 10 international agencies under the leadership of the World Health Organization (2018) formulated seven strategies for ending violence against children named INSPIRE ("Implementation and enforcement of laws; Norms and values; Safe environments; Parent and caregiver support; Income and economic strengthening; Response and support services; and Education and life skills" [37]). Promoting/establishing norms and values is one of the strategies in INSPIRE in which government authorities should acknowledge norms and values that support non-violent, respectful, nurturing, positive and gender-equitable relationships for all children and adolescents. If the awareness of subjective norms and value toward help-giving intention to victims of DV among university students can be increased, this might have a preventive effect on different types of violence. Subsequently, there are benefits in preventing victims' physical and mental health problems, crime rate, etc. [37].

Therefore, the present study aimed to develop and psychometrically test a new TPB-driven scale with two types of measure (direct and belief-based [indirect]) to assess bystanders' help-giving intention to victims of DV. The research framework for bystanders' help-giving intention to victims of DV was based on the TPB (see Fig. 1). Two hypotheses were tested. These were that:

1. The direct measure of Dating Violence Bystander Help-giving Intention Questionnaire (DVBHIQ) would have good validity, reliability, and measurement invariance (H$_1$).
2. The belief-based [indirect] measure of Dating Violence Bystander Help-giving Intention Questionnaire (DVBHIQ) would have good validity, reliability, and measurement invariance (H$_2$).

2. Materials and methods

2.1. Research design

A two-phase, mixed-method design was adopted because the intention of bystanders in Taiwan to assist victims of dating violence and its influencing factors are unknown. Therefore, it was necessary to conduct individual interviews in the form of qualitative research to develop a scale suitable for the behavioral intentions of bystanders in Taiwan to assist victims of dating violence. To establish the reliability and validity of the scale, it was necessary to carry out quantitative research and conduct psychometric analysis
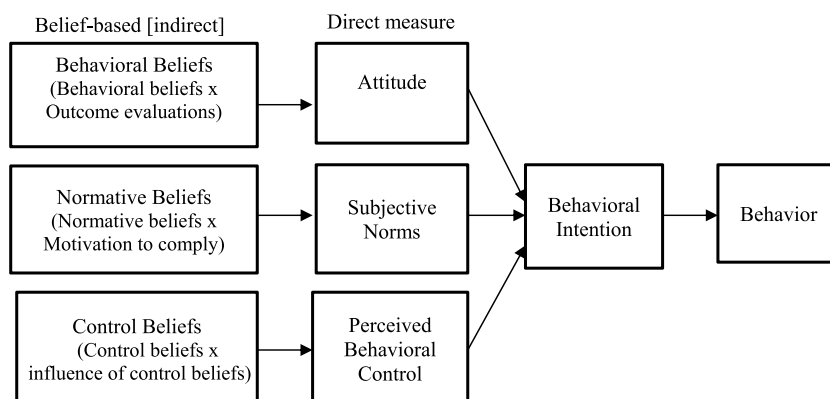

Fig. 1. The research framework for bystanders' help-giving intention to victims of DV based on the Theory of Planed Behavior.

to determine whether the two scales have good reliability and validity for future research. Consequently, mixed methods were adopted in the present study.

Phase I comprised instrument development and Phase II comprised psychometric evaluation. As aforementioned, Ajzen and Fishbein [25] and Ajzen [26] reported that TPB psychometric scale development can be divided into direct and indirect (belief-based) measures. The process of developing and validating the TPB-based Dating Violence Bystander Help-giving Intention Questionnaire (DVBHIQ) is outlined in Fig. 2. The data were drawn from partial findings of a comprehensive survey of dating violence bystander help-giving intentions among Taiwanese university students.

2.2. Participants

The primary source of the research samples was five universities each in Taiwan's northern, central, southern, eastern regions, and outer islands. In Phase I, the sampling method was purposive sampling for the qualitative sample (n = 10) and the pilot study (n = 220; response rate: 220/221 = 99.5%; 44 to 45 students were selected from each of the four grade levels) in which data were collected from October 2020 to January 2021 and from April to May 2021, respectively. According to the previous literature, it is suggested that this sample size (10 participants) may supply a suitable amount of information for exploratory qualitative studies [38]. The number of participants in a pilot study should be 3 to 5 times the number of items on the scale to be sufficient (here, 51 items need 153 to 255 participants) [39]. In Phase II, the sampling method was convenience sampling for the validation sample (n = 622; response rate: 622/657 = 94.6%), in which data were collected from June to July 2021. This sample size met the minimum requirement of 5–10 participants per item for factor analysis [40] and cross-validation.

In the qualitative study, the first author assessed participants so that they met the eligibility criteria. These were being university students who had bystander-related experiences concerning seeing or hearing DV incidents, who had rich information, and who were willing to participate in the individual interview. In the quantitative study, the participants were eligible if they were 18–25 years old Taiwanese university students who could communicate in either Mandarin or Taiwanese and who agreed to participate in the study. University students who were married were excluded. The flow chart of the study procedure is shown in Appendix 1.
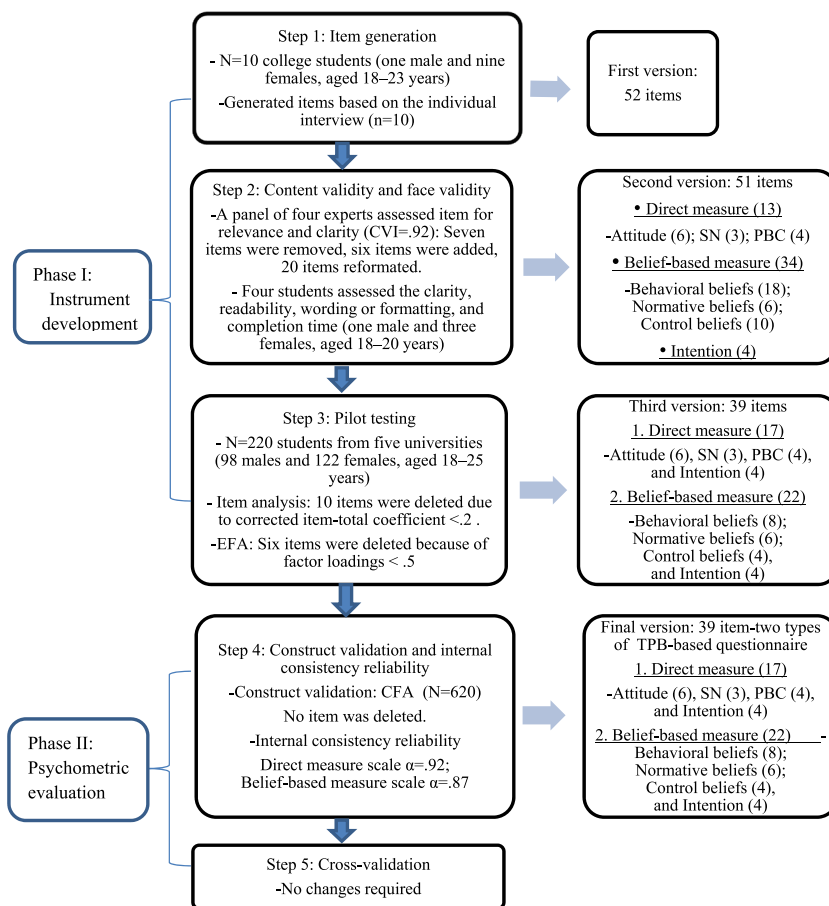
Note. SN = subjective norm; PBC = perceived behavioral control

Fig. 2. Process of developing and validating the TPB-based instrument.

2.3. Instrument

As aforementioned, the two types of DVBHIQ were developed over two phases (Phase I: Instrument development; Phase II: Psychometric evaluation) with five steps. The first version of the DVBHIQ developed in Phase I included 52 items, and the final DVBHIQ used in Phase II for psychometric testing included 39 items. The two types of DVBHIQ were 17 items for the direct measurement scale (13 direct items and four intention items) and 22 items (18 items [nine multi-composite items] and four intention items) for the belief-based (indirect) measurement scale. For the detailed changes in the number of items, see Fig. 2. All the items were rated using a seven-point Likert scale. A higher score indicates more positive attitudes/behavioral beliefs and subjective norms/normative beliefs, higher levels of perceived behavioral control/control beliefs and intention by the participants toward help-giving behavior to victims of DV.

2.4. Procedure and ethical considerations

In order to develop a scale that can assess bystander's help-giving behavioral intention and underlying specific beliefs among Taiwanese youth, the present study used the TPB as the theoretical framework and conducted a two-phase, mixed-method design. The complete study was conducted after obtaining ethics committee approval from a hospital organization (KMUHIRB-SV(I)-20200054). In the qualitative research, all participants saw the recruitment messages via internal emails and LINE groups and actively contacted the first author. The first author assessed whether participants met the eligibility criteria. After obtaining their written informed consent, the first author conducted individual face-to-face interviews.

In the quantitative study, the first author trained five students from five universities each in northern, central, southern, eastern, and outer islands regions of Taiwan. In the pilot study, qualified students recruited participants from their schools. In the validation study, the eligible students were also asked to forward the research information to other schools through online forums or chatting apps (such as LINE) and invite those people who are willing to participate in the study to the official LINE group. During the research process, well-trained research assistants were responsible for issuing QR codes or website addresses of the online survey to the participants, as well as collecting, sorting, and coding the survey data.

On the first page of the survey, "Certificate of Consent for Human Research" and "Research Instructions" were provided. These described the purposes of the study, risks and benefits, data confidentiality, and participants' rights (such as if individuals did not want to participate in the survey, no scores or grades on their course were affected). Participants could decide whether to participate after reading, and they gave their informed consent. For participants under 20 years old, their parents (guardians) completed a consent form to allow their children to participate in the study. When the research assistant confirmed the completed survey, the participant received a NT$100 voucher.

2.5. Data analysis

All interviews were audiotaped and subsequently transcribed verbatim in Chinese. The qualitative data were analyzed using content analysis by two researchers. The interview responses from participants were labeled and listed in order of frequency into four categories: attitude/behavioral beliefs, subjective norms/normative beliefs, perceived behavioral control/control belief, and intention toward bystander's help-giving intention. Instrument items were developed based on the results of the content analysis and then used to help produce the first version of the instrument. The quantitative data were analyzed using the IBM Statistical Package for Social Sciences (SPSS) version 22 and the Analysis of Moment Structures (AMOS) version 24.0 to conduct descriptive statistics, internal consistency, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and cross-validation. The significance level of each statistical test was set at $p < .05$.

2.5.1. Phase I data analysis

Content validity and face validity were analyzed using the content validity index (CVI), and an item with item CVI <0.75 was removed. Then, item-total correlation, skewness, kurtosis, item floor effect and ceiling effect, and critical ratio judgment analysis [41] were used to check the items retained after CVI. Items were further removed in the following conditions: (i) item-total correlation <0.2; (ii) absolute values of skewness and kurtosis >1 [42]; and (iii) independent *t*-tests in the critical ratio judgment analysis being nonsignificant (i.e., *t*-values <1.96). Later, EFA was used to determine the construct validity and factor structure. Principal component factor analysis with varimax and the normalization rotation method was applied. Items with factor loading less than 0.5 and away from their factor were deleted. Additionally, Kaiser's rule (i.e., eigenvalue >1), visual examination of the scree plot, factors consisting of three or more items with their primary loading, and minimal cross-loadings were used to determine the number of factors.

2.5.2. Phase II data analysis

Confirmatory factor analysis (CFA) was used to verify the factor structure derived from the Phase I EFA results. Two CFA models were constructed (one for direct measures and one for belief-based measures), and a maximum likelihood estimator was used for the CFAs. Before performing the CFAs, the normality assumption was checked; the absolute value of the skewness coefficient and kurtosis coefficients' absolute values were less than 1 [42]. The present Phase II data satisfied the normal distribution assumption. Then, the following fit indices were used to evaluate if the factor structure found by the EFA results was satisfactory: root mean square error of approximation (RMSEA) < 0.08, comparative fit index (CFI) > 0.9, the goodness of fit index (GFI) > 0.9, adjusted goodness of fit index (AGFI) > 0.9, standardized root means square residual (SRMR) < 0.08, Tucker-Lewis index (TLI) > 0.9, χ^2/df ratio <5 [43]. Composite reliability (CR) and average variance extracted (AVE) were calculated using the results.

After verifying the factor structure, the DVBHIQ was tested for convergent validity with the following three criteria: individual item loadings >0.5, CR > 0.7, and AVE for each construct >0.5 [44]. Then, the DVBHIQ was tested for discrimination validity with the use of AVE: when AVE values for any two constructs are more significant than the squared correlations between the two constructs [44] or when the square roots of the AVE are higher than the values of the correlations between the tested construct with another construct [45].

Lastly, the measurement invariance of the DVBHIQ across two random subsamples was tested. The two random subsamples were generated using the Phase II sample with the random sampling function in the SPSS 22. Moreover, four nested models were formed: a configural model (i.e., unconstrained model), a model with factor loadings constrained to be equal across subgroups (i.e., measurement weight model), a model with factor loadings and item intercepts constrained to be similar subgroups (i.e., structural covariance model), and a model with factor loadings, item intercepts, and item uniqueness constrained to be equal across subgroups (i.e., residual measurement model). The four nested modes were compared using the difference test, and a nonsignificant χ^2 indicates measurement invariance.

3. Results

3.1. Sample

In Phase I, the sample of the qualitative interviews was ten participants (one male and nine females) aged 18–23 years. Moreover, a pilot study with 221 participants completed the online survey. However, one withdrew, leaving 220 valid responses, including 98 males (44.5%) and 122 females (55.5%), with a mean age of 20.50 years (SD = 1.51), with ages ranging from 18 to 25 years.

In Phase II, 622 university students (94.6%) initially provided valid responses: 202 males (32.5%) and 420 females (67.5%), mean age 20.7 years (SD = 1.1), with ages ranging from 18 to 25 years (Table 1). The present study used an online survey. Each question had to be answered to move on to the next question. Consequently, there were no missing data. However, 31 participants responded mainly with the same answer, and four participants were aged over 25 years. These 35 participants were excluded from the data analysis.

Based on the qualitative analyses, the first version of DVBHIQ had 52 items and underwent the content validity index (CVI) and face validity processes. In the CVI process, seven items were removed, six items (two multi-composite items and two items) were added, and 20 items were reformulated according to the item CVI <0.75 [40] and experts' suggestions. The second version of the DVBHIQ comprised 51 items grouped into four subscales and divided into direct measures and belief-based (indirect) measures. These then underwent factor analysis.

3.2. Factor structure

Before conducting the EFA process to determine the factor structure, an item analysis was performed. Item analysis results showed that ten items needed to be deleted because the corrected item-total scale correlation coefficient was lower than 0.2 [46]. The number of items, means, standard deviations, skewness, and kurtosis for the factors are presented in Table 2; The absolute value of each item's skewness and kurtosis coefficient was less than 1. Therefore, the items were normally distributed, so they were all retained. Moreover, no meaningful cross-loadings, floor effects, or ceiling effect problems existed. Regarding critical ratio judgment analysis, the difference between the averages of the 25% of the highest and lowest scores groups was found to be significant (all *p*-values <.001), and the *t*-values were between 5.509 and 15.626, indicating that each question had a reasonable degree of discrimination, and no item needed to be deleted. Consequently, the 41-item pool included 13 items of direct measurement: attitude (six items), subjective norms (three items), perceived behavior control (four items), and behavior intention (four items); and 24 items of belief-based measurement of behavioral beliefs (10 items), normative beliefs (six items) and control beliefs (eight items); and intention (four items).

Table 1
Demographics of participants in Phase I and Phase II.

Variable	Phase I sample (n = 220)	Phase II sample (n = 622)
	n (%)/mean ± SD	n (%)/mean ± SD
Gender		
Males	98 (44.5)	202 (32.5)
Females	122 (55.5)	420 (67.5)
Age	20.5 ± 1.51	20.7 ± 1.14
18–20 years	107 (48.6)	276 (44.4)
21–25 years	113 (51.4)	346 (55.6)
School location in Taiwan		
Northern area	44 (20)	118 (19.0)
Central area	43 (19.5)	115 (18.5)
Southern area	45 (20.5)	146(23.5)
Eastern area	44 (20)	89 (14.3)
Outer island area	44 (20)	69 (11.1)
Unknown	0 (0)	85 (13.7)

Note. In phase I and phase II, participants' age ranged from 18 to 25 years.

Table 2
Mean, SD, skewness, kurtosis, and Cronbach's α of the two types of the Dating Violence Bystander Help-giving Intention Questionnaire in the Phase II sample.

Construct (item number)	Mean	SD	Skewness	Kurtosis	Cronbach's α
Direct measure (17)	83.96	12.79	−.29	.59	.90
Attitude (6)	28.10	4.38	−.43	.03	.84
Subjective norms (3)	14.95	3.32	−.21	−.19	.73
Perceived behavioral control (4)	18.43	4.54	−.01	−.22	.79
Intention (4)	22.48	3.90	−.66	.99	.93
Belief-based measure (22)	313.28	73.90	−.15	−.16	.84
Behavioral beliefs (8)	139.39	36.75	−.42	−.19	.79
Normative beliefs (6)	81.93	30.90	.26	−.47	.81
Control beliefs (4)	69.49	19.24	−.20	−.70	.72
Intention (4)	22.48	3.90	−.66	.99	.93

After deleting ten items following the item analysis, the remaining 41 items were subjected to EFA of the direct and belief-based measurements. In the direct measurement, the result of EFA showed the value of KMO was 0.895, which is greater than 0.8, indicating the sample size was adequate; Bartlett's test of sphericity (chi-square = 2723.685, df = 136, $p < .001$) confirmed the sufficiency of data, and the items were suitable for factor analysis. Four factors (attitude, subjective norms, perceived behavior control, and intention) were extracted with eigenvalues greater than 1 [47], which accounted for 72.67% of the total variance. In the belief-based measurement, the result of EFA showed six items with a factor loading of less than 0.5 [44] and away from their factor, and were therefore deleted. Performing a second EFA, the results showed that the KMO value was 0.89. Bartlett's test of sphericity (chi-square = 1915.37, df = 78, $p < .001$) confirmed the sufficiency of data. Four factors (behavioral beliefs, normative beliefs, control beliefs, and intention) were extracted, which accounted for 76.62% of the total variance. Finally, after the statistical analysis of item analysis and EFA, 16 questions were deleted. For the detailed changes in the number of items, see Fig. 2.

3.3. Reliability

In Phase I, Cronbach's alpha coefficients of the full scale of direct measurement (17 items) and belief-based measurement (22 items) were 0.92 and 0.87, respectively. Furthermore, Cronbach's alpha coefficients for all subscales were greater than 0.7 (Table 3). In Phase II, the Cronbach's alpha coefficients were 0.90 for the direct DVBHIQ (17 items) and 0.84 for the belief-based DVBHIQ (22 items). Moreover, Cronbach's alpha coefficients for all subscales were greater than 0.7 (Table 2) demonstrating good internal consistency [48]. The corrected item-total scale correlation coefficient between each item was greater than 0.2 [46].

3.4. Correlational analysis

The Pearson's correlation matrix (Table 4) shows that the correlation coefficient values among the full scale and the subscales ranged from 0.44 to 0.84 ($p < .01$) in the direct measures instrument and 0.48 to 0.86 ($p < .01$) in the belief-based measures instrument, indicating that there were moderately positive correlations between the subscale and the full scale [49]. This result indicates that the two types of direct and belief-based instruments of the DVBHIQ are suitable for assessing the same trait with appropriate internal consistency reliability, and are ideal for use as a psychometric scale. Therefore, the present study adopted CFA to test the construct validity of the scales.

3.5. Validity

3.5.1. Construct validity
Two confirmatory factor analyses (CFAs) were conducted for both the direct measures (Fig. 3a) and belief-based measures (Fig. 3b) to determine whether the four-factor model identified from the EFA fitted the data or required modification. The results are as follows:

(1) Fit index of the overall model

All fit indices indicated that both direct and belief-based measures had good goodness of fit, such as RMSEA, CFI, GFI, AGFI, SRMR, and TLI (see Table 5 for detailed statistics of the two models) [50]. Moreover, the χ^2/df ratio slightly greater than 3 in the present study in the direct and belief-based measures were 3.27 and 3.68, respectively, and were acceptable.

(2) Convergent validity

The convergent validity for the proposed constructs of the direct measure had two items with individual item loadings less than 0.5 (Appendix 2). The belief-based measure was good because the three criteria (individual item loadings >0.5, AVE >0.5, and CR > 0.7) for each construct were satisfied [44].

Table 3

Four factors for the two types of the Dating Violence Bystander Help-giving Intention Questionnaire (DVBHIQ) in Phase I (n = 220).

Item No.	Statement/Response and Scoring	Factor loading	Cronbach's α	Variance explained (%)
Direct measures (17 items)				72.67%
Attitude (6 items)			.89	21.55
1	The worse the dating violence, the more I will help the victim.	.56		
	1 (Strongly disagree) to 7 (Strongly agree)			
2	The closer my relationship with the victim, the more willing I will help the victim.	.74		
	1 (Strongly disagree) to 7 (Strongly agree)			
3	All in all, helping the victims of dating violence for me is ….	.73		
	1(very harmful) to 7 (very beneficial)			
4	Overall, helping the victims of dating violence for me is ….	.76		
	1 (Extremely incorrect) to 7 (Extremely correct)			
5	To sum up, helping the victims of dating violence for me is ….	.75		
	1 (Extremely incorrect) to 7 (Extremely correct)			
6	In simple terms, helping the victims of dating violence for me is ….	.75		
	1 (Very unimportant) to 7 (Very important)			
Subjective norm (3 items)			.72	11.02
7	For me, most influential people (e.g., parents, friends) agree that I help victims of dating violence	.66		
	1 (Strongly disagree) to 7 (Strongly agree)			
8	Most people who are important to me (e.g., parents, friends) expect me to be able to help victims of dating violence	.70		
	1 (Strongly disagree) to 7 (Strongly agree)			
9	I feel pressure from society about the need to help victims of dating violence	.74		
	1 (Strongly disagree) to 7 (Strongly agree)			
Perceived behavior control (4 items)			.85	17.69
10	If I want to help the victims of dating violence, I am confident that I can help them	.74		
	1 (Strongly disagree) to 7 (Strongly agree)			
11	It is easy for me to help victims of dating violence	.88		
	1 (Strongly disagree) to 7 (Strongly agree)			
12	If I want to help the victims of dating violence, I can do it	.84		
	1 (Strongly disagree) to 7 (Strongly agree)			
13	It is entirely up to me to help victims of dating violence	.61		
	1 (Strongly disagree) to 7 (Strongly agree)			
Intention (4 items)			.92	22.41
14	In the next six months, if I see or hear about a victim of dating violence, I expect that I will help them	.77		
	1 (Very unlikely) to 7 (Very likely)			
15	In the next six months, if I see or hear about a victim of dating violence, I will want to help them	.73		
	1 (Very unlikely) to 7 (Very likely)			
16	In the next six months, if I see or hear about a victim of dating violence, I plan to help them.	.85		
	1 (Very unlikely) to 7 (Very likely)			
17	In the next six months, if I see or hear about a victim of dating violence, I should help them.	.80		
	1 (Very unlikely) to 7 (Very likely)			
Belief-based (indirect) measures (22 items = 18 items [9 composite items] + intention 4 items)				**76.62%**
Behavioral beliefs (8 items)	**Outcome evaluation**		.81	15.90
1 If I help victims of dating violence, I can learn from experience and know how to react to similar situations in the future. 1 (Strongly disagree) to 7 (Strongly agree)	1-1 The above thing for me is … *1 (Very bad) to 7 (Very good)*	.79		
2 If I help the victim of dating violence, it makes me feel happy to help. 1 (Strongly disagree) to 7 (Strongly agree)	2-1 "Happiness of help-giving" for me is …. *1 (Very unimportant) to 7 (Very important)*	.73		
3 Helping the victims of dating violence will make my conscience better 1 (Strongly disagree) to 7 (Strongly agree)	3-1 Worthy of my conscience, for me it is … *1 (Very unimportant) to 7 (Very important)*	.63		
4 If I am at the scene of severe dating violence, or if the victim is traumatized or depressed due to dating violence, it makes me want to help them.	4-1 To help someone severely abused, for me, it is … *1 (Very unimportant) to 7 (Very important)*	.56		

Table 3 (*continued*)

| Item No.	Statement/Response and Scoring	Factor loading	Cronbach's α	Variance explained (%)
	1 (Strongly disagree) to 7 (Strongly agree)			
Normative beliefs (6 items)	**Motivation to comply**		.86	19.35
5 If my parents knew, they would think I should help the victim of dating violence. 1 (Strongly disagree) to 7 (Strongly agree)	5-1 I would be willing to listen to the expectation of my parents. *1 (Strongly unwilling to) to 7 (Strongly willing to)*	.84		
6 My teacher thinks I should help the victim of dating violence. 1 (Strongly disagree) to 7 (Strongly agree)	6-1 I would be willing to listen to the expectation of my teachers. *1 (Strongly unwilling to) to 7 (Strongly willing to)*	.85		
7 My best classmate/friend thinks I should help the victim of dating violence. 1 (Strongly disagree) to 7 (Strongly agree)	7-1 I would be willing to listen to the expectation of my best classmate/friend. *1 (Strongly unwilling to) to 7 (Strongly willing to)*	.76		
Control beliefs (4 items)	**Power of control**		.79	16.51
8 Because I have friends with whom I can discuss this together, it makes me want to help the victims of dating violence more. 1 (Strongly disagree) to 7 (Strongly agree)	8-1 If I want to help victims of dating violence, I have friends around me to discuss it with *1 (Very uncertain) to 7 (Very sure)*	.76		
9 Because the victim provides enough information on dating violence and articulates their needs, it makes me want to help them. 1 (Strongly disagree) to 7 (Strongly agree)	9-1 If the victim provides sufficient information on dating violence and clearly expresses their needs, I will be able to think of (or master ways) to help them 1 (Strongly disagree) to 7 (Strongly agree)	.83		
Intention (4 items)			.92	24.86
10	In the next six months, if I see or hear about a victim of dating violence, I expect that I will help them 1 (Very unlikely) to 7 (Very likely)	.87		
11	In the next six months, if I see or hear about a victim of dating violence, I will want to help them 1 (Very unlikely) to 7 (Very likely)	.65		
12	In the next six months, if I see or hear about a victim of dating violence, I plan to help them 1 (Very unlikely) to 7 (Very likely)	.89		
13	In the next six months, if I see or hear about a victim of dating violence, I should help them. 1 (Very unlikely) to 7 (Very likely)	.86		

(3) Discriminant validity

In Table 6, the discriminant validity of the two types of DVBHIQ constructs appeared satisfactory because the diagonal elements in the matrix were the square roots of the AVE and because these were higher than the values of their corresponding rows and columns in both measures [45].

Table 4
Correlation matrix between scales and subscales of the two types of Dating Violence Bystander Help-giving Intention Questionnaire in the Phase II sample.

Construct	1	2	3	4	5	6	7	8	9	10
1 Attitude	–									
2 Subjective norm	.45**	–				.				
3 Perceived behavioral control	.44**	.42**	–							
4 Intention	.64**	.44**	.57**	–						
5 (Total) Direct measure	.83**	69**	78**	.84**	–					
6 Behavioral beliefs						–				
7 Normative beliefs						.45**	–			
8 Control beliefs						.54**	.54**	–		
9 Intention						.57**	.45**	.54**	–	
10 (Total) Belief-based measure						.86**	.81**	.78**	.67**	–

Note. **p < .01.
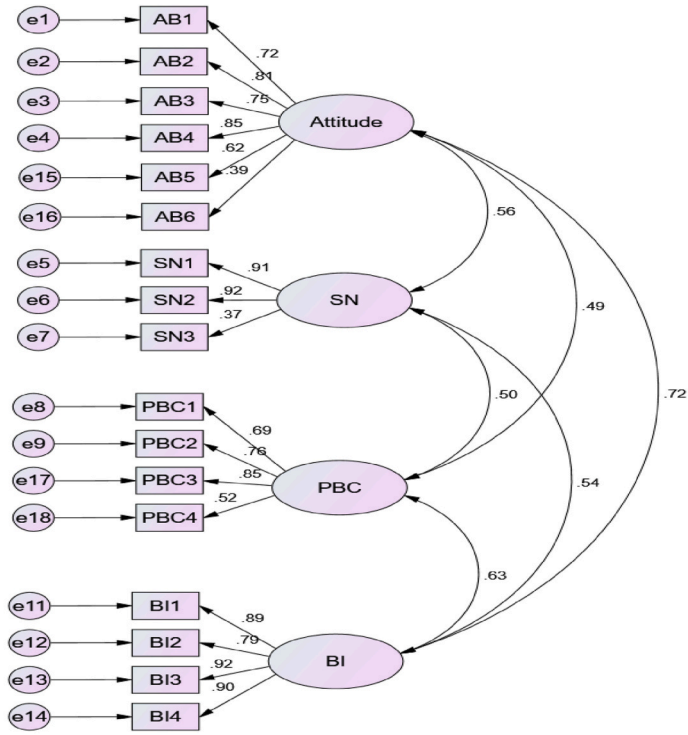
a
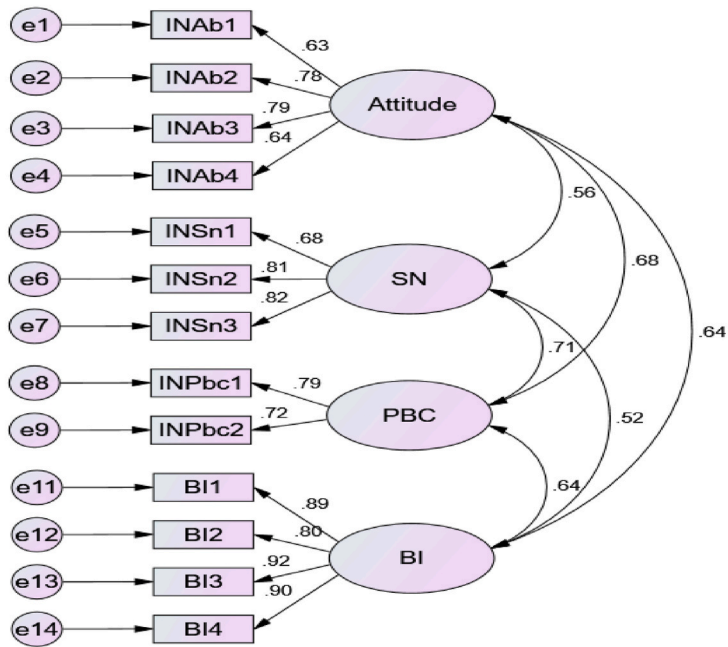
b

(caption on next page)

Fig. 3a. CFA of the direct measurement model of the Dating Violence Bystander Help-giving Intention Questionnaire. CFA of the belief-based measurement model of the Dating Violence Bystander Help-giving Intention Questionnaire.

Table 5
Goodness-of-fit information for the direct and belief-based measure of the Dating Violence Bystander Help-giving Intention Questionnaire model in the Phase II sample.

Fit index	Ideal requirements	Research model fit
Direct measure		
ML χ^2	The smaller, the better	369.11
df (degree of freedom)	The bigger, the better	113
Normed chi-square (χ^2/df)	1< χ^2/df < 3	3.27
GFI	>.9	.93
AGFI	>.9	.91
RMSEA	<.08	.06
SRMR	<.08	.05
TLI (NNFI)	>.9	.95
CFI	>.9	.96
Belief-based measure		
ML χ^2	The smaller, the better	216.89
df (degree of freedom)	The bigger, the better	59
Normed chi-square (χ^2/df)	1< χ^2/df < 3	3.68
GFI	>.9	.95
AGFI	>.9	.92
RMSEA	<.08	.07
SRMR	<.08	.05
NNFI	>.9	.95
CFI	>.9	.97

Note. Abbreviation: GFI, the goodness of fit index; AGFI, adjusted goodness of fit index; RMSEA, root mean square error approximation; SRMR, standardized root mean square residual; NNFI, Non-Normed Fit Index, CFI, Comparative Fit Index.

Table 6
Discriminant validity of the two types of the Dating Violence Bystander Help-giving Intention Questionnaire in the Phase II sample.

	AVE	1	2	3	4
Direct measure					
1 Attitude	.50	**.71**			
2 Subjective norms	.60	.56***	**.78**		
3 Perceived behavioral control	.51	.49***	.50***	**.72**	
4 Intention	.77	.72	.54	.63	**.88**
Belief-based measure					
1. Attitude	.82	**.71**			
2 Subjective norms	.83	.56***	**.77**		
3 Perceived behavioral control	.73	.68***	.71***	**.75**	
4 Intention	.94	.64	.52	.64	**.88**

Note. The square root of AVEs is represented in bold, and other values represent the correlations between the latent factors. ***$p < .001$.

(4) Composite reliability (CR) and average variance extracted (AVE)

The CR of each subscale was between 0.72 and 0.93, all greater than 0.70, indicating that the scale had good composite reliability. The results of the estimation of individual item reliability and the reliability of measures of the four-factor model are shown in Appendix 2. Finally, the average variance extracted (AVE) values were greater than 0.5 and ranged from 0.50 to 0.77.

3.5.2. Cross-validation via measurement invariance

Cross-validation via measurement invariance across groups for the direct and belief-based measures of the Dating Violence Bystander Help-giving Intention Questionnaire was carried out among the Phase II sample. The results of the cross-validation test showed that all nested models were not significantly different (according to the χ^2 difference tests), which meant that the two types of DVBHIQ were nonsignificant, indicating that the two types of DVBHIQ had cross-group stability. Detailed information can be found in Appendix 3.

To sum up, the final version of the direct measure of DVBHIQ had 17 items (13 direct item measures and four intention items), and the belief-based measure of DVBHIQ had 22 items (18 belief-based item measures and four intention items). The four factors (attitude/behavioral beliefs, subjective norms/normative beliefs, PCB/control beliefs scales, and intention) of the direct and belief-based measures of the DVBHIQ had adequate reliability, construct validity, and measurement invariance which support both study hypotheses (H_1 and H_2). The full questionnaire can be found in Appendix 4.

4. Discussion

In the present study, the development of a TPB-based instrument and its psychometric properties were reported with two types designed to assess the determinants of bystanders' help-giving intention to victims of DV among Taiwanese university students. The present study extends the previous application of the TPB by advancing a theory-based model for explaining bystander help-giving intention to victims of DV. To the best of the authors' knowledge, this is the first attempt in this field to evaluate university students' intention to help victims of DV based on the TPB that can be used to evaluate the results of related studies in DV prevention education programs.

Results of the present study provide early evidence of the two types of DVBHIQ as valid and reliable instruments to assess bystanders' help-giving intention. Moreover, the present study demonstrated that direct and belief-based measures in bystander help-giving intentions toward victims of DV accounted for 72.67% and 76.62% of the total variance, indicating that the scales adequately capture the underlying construct. This was greater than the findings of the previous studies which reported that the TPB model explained 37.5%–44.8% of the variance in the intention which related to violence [28,31]. These findings support the TPB's conceptual framework, encompassing the four constructs of attitude/behavioral beliefs, subjective norms/normative beliefs, perceived behavioral control/control belief, and intention. As a result, the study hypotheses (H$_1$ and H$_2$) were both supported.

Using CFA to determine whether the proposed model identified from EFA fitted the data, the CFA results supported the four factors of the DVBHIQ. However, two items [*"In simple terms, helping the victims of DV for me is ... 1 (Very unimportant) to 7 (Very important)"* and *"I feel pressure from society about the need to help victims of DV) ... 1 (Strongly disagree) to 7 (Strongly agree)"*] had factor loadings less than 0.5 (i.e., unsatisfactory loading according to Hair et al. [44]) in the direct measurement. However, these two items were retained for corroboration in future studies because the (i) DVBHIQ is newly developed instrument; therefore, it is unclear if the two items would consistently have low factor loadings or they just had low factor loadings in the present sample, and (ii) results from other statistical analyses performed in the present study supported the validity of the two items. Therefore, future studies need to examine whether the two items can be revised or deleted to increase factor loading in the instrument.

When cross-validated with data from the sample (n = 622) divided into two groups, this model supported the two newly constructed DVBHIQ instruments, the final version being more robust. Given this, the results of the present study identified that the direct and belief-based measures of the DVBHIQ had adequate reliability, construct validity, and measurement invariance. The two types of DVBHIQ may help address the core cognitive determinants for bystander help-giving intention.

Compared with the Bystander Behavior Intentions-Friends Scale [36], which only focuses on friends, these two types of DVBHIQ can be used for bystanders around the victims of DV. That is, the strengths of DVBHIQ can assess help-giving intention for any bystander, including their friends. They can be generally used to investigate bystander help-giving intention toward individuals experiencing DV and its determinants. Moreover, the two valid and reliable scales help further understand correlates (e.g., attitude, SN, and PBC) and evaluate the outcome of bystander intervention programs in preventing DV. Consequently, future research and bystander intervention program evaluations can determine which factors contribute to changes in bystander help-giving intentions (e.g., attitudes, SN, and PBC), which are the emphasis of many programs and targeted areas for change [36]. This might decrease the incidence and severity of DV. The weakness of DVBHIQ is that concurrent validity was not analyzed due to a lack of an available comparable scale.

Furthermore, there are many psychometric scales that have been developed based on the TPB and that have been successfully implemented. These include (but are not limited to (i) predicting the intention of pre-service physical activity instructors for individuals with disabilities to participate in pro bono work among 322 university students majoring in adapted physical activity in South Korea [51], (ii) assessing student paramedics' beliefs about case-based learning in their education [52], and (iii) assessing the intention to work with older adults in a health care setting among 759 students in the United States [53]. The results of these studies support the use of TPB in designing the DVBHIQ.

The novelty of the present study was the (i) use mixed methods (i.e., use of both qualitative and quantitative research), to understand the influential factors toward help-giving victims of DV based on the TPB among young people of Taiwan, and (ii) development of a brief psychometric scale with good reliability and validity which can be used in future studies. As the TPB is a cross-culturally applicable theory [54] and considering that DV is global, it is hoped that the two scales will be helpful to scholars and practitioners (e.g., school nurses) worldwide.

4.1. Limitations and future directions

The study has a number of limitations. First, students self-selected their participation in the study. A multi-setting sampling method was used to recruit participants from five universities in the northern, central, southern, eastern regions, and outer islands of Taiwan to increase sample heterogeneity. However, of the participants who volunteered to participate, only one male participated in the individual interviews in the qualitative study 1 (n = 10), and fewer males (32.5%) than females (67.5%) participated in the main study which is not representative of university students more generally. In future research, more gender-balanced studies are needed to confirm the findings of the present study. It will also be helpful to see how different the genders are in their responses. Second, self-reporting might have influenced the answers by showing more social desirability intentions (although an online survey was used which tends to increase response veracity). Armitage and Conner also reported that social desirability had a minimal impact on TPB models [55]. Third, concurrent validity was not analyzed due to lack of available comparable scales. However, to the best of the present authors' knowledge, this is the first theory-based instrument to assess the cognitive determinants of bystander help-giving intention toward DV victims. Finally, all samples used in developing the two types of DVBHIQs were enrolled university students which may

limit the generalizability of the findings to demographically more diverse groups such as students on leave of absence or young people not attending university. It is suggested that future research uses the two types of DVBHIQs to explore the validity and generalizability of the scale among different groups of participants.

Scholars in the field should replicate the present study elsewhere on similar populations. Moreover, healthcare providers and researchers in the area of DV can apply these two TPB-based scales to understand the core cognitive needs of bystander help-giving intention to victims of DV before designing bystander intervention programs for youths on college and university campuses. Furthermore, to examine the predictive validity of the DVBHIQ, it is recommended that a longitudinal study should be conducted to incorporate subsequent measures of behavior to assess the predictive effect of the intention to help victims of DV on actual help-giving behavior.

Recent research suggests that the Theory of Planned Behavior has great generalizability and practical significance which has ensured its widespread adoption. The present study found that the TPB helps understand how to generate behavioral intentions or real behavioral responses. It has also been found to be a reliable predictor of intentions and behavior, allowing interventions to be tailored to individual needs in all situations (e.g., everyday situations vs. crises). The TPB in bystander phenomena has additional importance that should be investigated. When studying the bystander phenomenon, the three elements of bystander, situation, and intervention should be considered so that there is a better understanding of how these interact and contribute to bystander behavior [56]. By doing so, practitioners and researchers can better identify strategies to intervene in real-life situations. Furthermore, Hou et al. [28] used TPB to explore the related factors of dating violence perpetrators' intention to commit violence. Therefore, future research can also use the TPB to explore the related factors of the victim's help-seeking behavior intention, which will help to have a complete understanding of the behavior of those involved in dating violence.

5. Conclusion

The (17-item) direct measure and the (22-item) belief-based measure of the DVBHIQ are self-report TPB-based instruments with good feasibility, reliability, validity, and measurement invariance that assess university students' help-giving intention toward victims of DV. Therefore, the two types of DVBHIQ can be utilized by researchers who are interested in intimate relationship violence to expand knowledge regarding the cognition and socio-cultural determinants of bystanders' help-giving intentions toward victims of DV. Moreover, it is recommended that healthcare providers (e.g., school nurses) use the two types of DVBHIQ to gain a comprehensive understanding of the cognitive barriers and facilitators of bystander help-giving intention toward victims of DV in different countries and cultures. According to the results of evidence-based research, healthcare providers can design a suitable DV prevention education program. The results of the present study suggest that the TPB is a robust theory to guide the development of theory-driven bystander education programs to reduce DV prevalence and severity. Further research on these two instruments is recommended to assess their psychometric characteristics in different communities and contexts.

Author contribution statement

Chung-Ying Lin; Ying-Hua Tseng; Mei-Ling Lin; Mark D. Griffiths: Conceived and designed the experiments; Analyzed and interpreted the data; Wrote the paper.

Wen-Li Hou: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools, or data; Wrote the paper.

Data availability statement

Data will be made available on request.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2023.e19706.

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