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External validity of the Psychiatric Diagnostic Screening Questionnaire (PDSQ) in a clinical sample

Hana Perkey[a,*], Samuel Justin Sinclair[b], Mark Blais[c], Michelle B Stein[c], Pilar Neal[d], Austin Drew Pierson[d], Jenelle Slavin-Mulford[d]

[a] Counseling Program, SafeHomes of Augusta, Augusta, GA, USA
[b] Clinical Psychology Program, William James College, Newton, MA, USA
[c] Psychological Evaluation and Research Laboratory (PEaRL), Massachusetts General Hospital and Harvard Medical School, Boston, MA, USA
[d] Department of Psychological Sciences, Augusta University, Augusta, GA, USA

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ABSTRACT

This study contributes to the convergent and discriminant validity of the Psychiatric Diagnostic Screening Questionnaire (PDSQ) by investigating its correlations with the relevant clinical scales of the Personality Assessment Inventory (PAI) and life space variables, such as relationship status, education level, job loss, and history of suicide attempts. Bivariate correlations were calculated for a sample of 254 psychiatric outpatients. The results indicated that the PDSQ scales demonstrated good to excellent convergent and discriminant validity with target scales from the PAI. They were also found to be meaningfully associated with a variety of life space variables. For example, five of the subscales and the Total Score correlated positively with a recent job loss, and eight of the subscales were negatively associated with education and/or employment status. Some incongruence with hypothesized relationships was discovered for life correlates classified as markers of psychiatric severity. Overall, these findings add to the emerging body of evidence corroborating the convergent and discriminant validity of the PDSQ.

1. Introduction

The Psychiatric Diagnostic Screening Questionnaire (PDSQ; Zimmerman and Mattia, 2001a, 2001b) is a self-report measure of psychiatric symptoms that screens for the most common Axis I disorders as outlined in the DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; American Psychiatric Association, 1994). The PDSQ's content and structure was developed to reflect the diagnostic criteria included in the DSM-IV and validated using structured interviews and clinician-determined diagnoses (Zimmerman, 2002). A total of 125 dichotomous items constitute 13 subscales: Depression (DEP), Post-Traumatic Stress (PTSD), Bulimia (BUL), Obsessive-Compulsive (OCD), Panic (PAN), Psychosis (PSYCH), Agoraphobia (AGOR), Social Phobia (SOC PHOB), Alcohol (ETOH), Drug (DRUG), Generalized Anxiety (GAD), Somatization (SOMAT), and Hypochondriasis (HYPOCH).[1] Additionally, the PDSQ Total Score indicates a severity of overall psychopathology (Zimmerman and Mattia, 1999b). The subscales were selected based on the most frequently recorded and reported diagnoses in community surveys and clinical settings (Zimmerman and Mattia, 2001a, 2001b).

Zimmerman and Mattia (2001a) noted several goals in developing the PDSQ. One of the primary purposes was to aid clinicians in attaining an accurate diagnosis in a time-efficient manner (Zimmerman and Mattia, 2001a). In addition, the PDSQ developers strove to address issues related to under-recognition of comorbid disorders in clinical practice associated with the use of unstructured intake interviews (Zimmerman and Mattia, 1999a). Given that a large percentage of patients seeking mental health services presents with more than one diagnosis (Kessler et al., 2005), the PDSQ's capacity to identify comorbidities and its close alignment with the DSM-IV makes it an attractive choice for a screening and diagnostic aid in a variety of mental health care settings. In addition, the measure's brief format and its binary nature further reduces the test taker's burden and increases the efficiency of the screening process. For the PDSQ to fulfill its intended purpose, the measure's validity must be established in a comprehensive manner.

During the scale's development, the PDSQ underwent two rigorous psychometric evaluations in a large sample of psychiatric outpatients

* Correspondence to: SafeHomes of Augusta, P.O. Box 3187, Augusta, GA 30914, USA.
E-mail address: hana@safehomesdv.org (H. Perkey).

[1] Throughout this paper, abbreviations for the PDSQ subscales will be used. Please see Table 1 for a listing of all PDSQ scale abbreviations used in this paper along with means and standard deviations for each scale obtained in our sample.

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(Zimmerman and Mattia, 2001a, 2001b). The researchers showed that PDSQ subscales had good to excellent test-retest reliability ranging from .61 to .93 as well as high internal consistency with Cronbach's alpha values between .66 and .94 (Zimmerman and Mattia, 2001a). Similarly, the individual subscale items proved to have acceptable levels of test-retest reliability and overall correlated more highly with their own subscale than subscales assessing different symptom domains, thus showing good discriminant validity (Zimmerman and Mattia, 2001a). Additionally, the subscales evidenced good convergent validity with other measures assessing corresponding pathology, as well as good concurrent validity with diagnoses obtained using Structured Clinical Interviews for DSM-IV (SCID; First et al., 1997) and unstructured intake interviews (Zimmerman and Mattia, 2001a). In a follow up study, Zimmerman and Mattia (2001b) also established that the PDSQ evidenced good diagnostic sensitivity. These results have since been replicated and expanded upon by a number of other studies (Zimmerman and Chelminski, 2006; Zimmerman and Sheeran, 2003; Zimmerman et al., 2004).

Although the empirical support for the PDSQ has grown, a broader empirical grounding is needed to build confidence in the psychometric properties of this screening tool. Specifically, to our knowledge, no studies have considered the convergent validity of the PDSQ with a broadband personality measure of psychiatric symptoms that is theoretically and empirically derived (i.e., not solely grounded in the diagnostic criteria of the DSM). In addition, the construct validity of the PDSQ has also not been established in relation to an array of real-life experiences which often accompany or co-occur with specific symptomatology. Thus, the present study investigated the PDSQ's validity by examining its relationships with the Personality Assessment Inventory (PAI; Morey, 1991, 2007) as well as its associations with important life space data, as defined by Mayer (2004) and Brackett (Brackett and Mayer, 2006) in terms of their observability, verifiability, and/or historical nature. Using both the PAI scales and life space data has the advantage of method variance (Campbell and Fiske, 1959): employing varied methods of trait measurement for the purposes of validation investigation (i.e. self-report test data, clinician derived evaluations, and current or historical personal record information).

The PAI was selected for this investigation because its clinical scales evaluate many of the same symptom domains assessed by the PDSQ, and at the same time, the PAI differs significantly from the PDSQ in the basis for its development. Unlike the PDSQ, the PAI is derived both empirically and from a theoretical understanding of mental disorders, as well as practical knowledge of clinicians. In addition, the PAI has a primary focus of informing treatment planning and execution (Morey, 1996). Importantly, the PAI has garnered extensive empirical support for both its convergent and discriminant validity (Bradley et al., 2007; Douglas et al., 2007; Morey, 1991; Stein et al., 2007; Walters and Geyer, 2005; Wang et al., 1997) as well as its criterion validity (Boccaccini et al., 2010; Caillouet et al., 2007; Patry et al., 2011; Salekin, 2008; Slavin-Mulford et al., 2012; Walters et al., 2003).

Given the measures' shared focus on specific symptom domains, the PAI includes subscales that correspond to most of the PDSQ scales. As such, hypotheses for anticipated correlations could be made based on specific symptom domain/diagnostic category for all but the PDSQ BUL scale. For example, the PDSQ and PAI both have scales related to depression and anxiety. Thus, the PDSQ DEP scale would be expected to correspond with PAI DEP and the PDSQ GAD scale with PAI ANX.[2] While these pairings would be anticipated to display strong, positive relationships, multiple correlations of varying strengths should also be evident between the individual PDSQ subscales and the PAI scales based on the frequent comorbidity of psychiatric diagnoses and symptom overlap inherent in the DSM-IV criteria for diagnostic categories (e.g., GAD, SOC PHOB, and PAN all include some physiological symptoms of anxiety; Watson et al., 2016). Finally, as the PDSQ Total Score is calculated to express an overall severity of pathology, it should correlate with many of the PAI scales as well as the PAI MCE index.

We also used life space data to explore the explicit behaviors or major life outcomes which are often associated with clinical presentations of the DSM-IV diagnoses included in the PDSQ. These include variables such as education level, employment, health status, and psychiatric hospitalization history. This information can be obtained fairly objectively from an individual's life history or from formal historical records (John and Soto, 2007). As in the case of the PDSQ's scales correlating with multiple PAI scales, a degree of covariation among the scales and the various life space events would also be expected, primarily due to the comorbidity of psychiatric symptoms. For instance, scales related to internalizing disorders (e.g., DEP and GAD) would likely exhibit similar relationships to many of the life space variables (Hopwood and Moser, 2011; Krueger, 1999; Slavin-Mulford et al., 2012). In addition, scales would be predicted to correlate with associated symptom expressions or behavioral tendencies. For example, PDSQ PSYCH should be related to a history of hallucinations. Finally, due to the source variance, the PDSQ's correlations with the selected life correlates should be smaller in magnitude than its correlations with the PAI.

In sum, the construct validity of the PDSQ scales should be evident in their pattern of associations with the PAI scales and the life space variables. The goal of this study is to explore such relationships by examining correlations of the 13 PDSQ subscales and its Total Score with the corresponding PAI scales and eight life space variables.

2. Method

2.1. Participants

Two hundred and fifty-four participants were identified from a record review of outpatients who completed the PDSQ and PAI as part of a clinical assessment. All participants had been referred by a mental health professional for a psychological evaluation at a large teaching hospital. Patients were generally complex (psychiatrically and/or medically) and referral questions were usually initiated to better understand the patients' strengths and challenges, level of functioning, and to inform treatment. As part of the evaluation process, the patients' current diagnoses were obtained from the referring professional and/or medical record.[3] Of note, approximately 80% of the sample had more than one diagnosis at the time of referral and approximately 43% reported having been previously psychiatrically hospitalized. Regarding other demographics, 53% of the sample was male. The mean age was 41.45 years (SD = 15.74, range 18–81). The racial and ethnic composition was reported as 86.2% white, 5.5% Hispanic, 3.9% African American, 2.4% Asian, .4% Native Hawaiian/Pacific Islander, with the remainder of the sample identifying as other or omitting the response. Finally, the vast majority of participants had completed high school (94.5%) with an average educational attainment equal to 14.82 years (SD = 2.65, range of 8–22).

2.2. Procedures

The assessments were conducted by licensed psychologists or by post-doctoral fellows and pre-doctoral psychology interns under supervision. After reviewing the referral question and medical record (when available), clinicians conducted a semi-structured interview designed by one of the authors (M.A.B.). The interview aimed to systematically capture clinically relevant information regarding a patient's

[2] Throughout this paper, abbreviations for the PAI subscales will be used. Please see Table 2 for a listing of all PAI scale abbreviations used in this paper along with means and standard deviations for each scale obtained in our sample.

[3] See Table 3 for participant diagnoses.

current functioning along with his/her psychiatric, developmental, educational, relational, occupational, medical, and legal history. The information obtained from the interview and medical record provided the data for the eight life space variables selected as external validity targets for the PDSQ sales. The eight variables formed three broad categories including: life outcomes (education, employment, recent job loss, and history of abuse), markers of psychiatric severity (history of hallucinations, suicide attempts, and psychiatric hospitalization), and physical health status (history of medical problems).[4] The variables were selected because they represented a wide range of meaningful life experiences, were relatively complete in the database, and were judged to have a high degree of objectivity.

The PDSQ and PAI were administered after the interview along with other measures of personality, psychopathology, and neuropsychological functioning depending on the needs of the individual assessment. Given that the PDSQ and PAI were always administered after the interview, clinicians were blind to the PDSQ and PAI results when conducting the interview.

All of the participants included in this study produced valid PAI profiles based on Morey's recommended cutoff scores (Morey, 1991, 2007). Following these clinical evaluations, all assessment data were entered into a de-identified, IRB-approved data repository.

2.3. Measures

2.3.1. PDSQ

The PDSQ (Zimmerman, 2002) is a self-report measure designed to screen for the most common DSM-IV Axis I disorders, as well as to examine comorbidity of disorders. The PDSQ comprises of 125 dichotomous items constituting 13 subscales as well as a Total Score (See Table 1 for scales). The development of the PDSQ involved a series of four studies with the total sample exceeding 2500 participants (Zimmerman and Mattia, 2001b). The scale has been shown to have adequate psychometric properties with Cronbach's coefficient alpha values ranging from .66 to .94 (Zimmerman and Mattia, 2001a).

2.3.2. PAI

The PAI (Morey, 1991, 2007) is a self-report multi-scale measure used to assess psychopathology, substance abuse, treatment-related issues, and interpersonal style. It contains 344 items comprising 22 non-overlapping scales: 4 validity scales, 11 clinical scales, 5 treatment scales, and 2 interpersonal scales. Norms for the PAI were developed from three separate samples: a census matched sample (N = 1000), a college sample (N = 1051), and a clinical sample (N = 1246; Morey, 2007). Previous research has shown that the PAI maintains adequate psychometric properties when administered to clinical samples (Siefert et al., 2009). In this study, we chose the 12 PAI scales that most closely match the PDSQ subscales to be used as external validity targets. Thus, the PAI DEP scale was selected to correspond with the PDSQ DEP subscale, PAI ARD-T was matched with PTSD, PAI ARD-O with OCD, PAI ANX-P with PAN, PAI SCZ-P with PSYCH, PAI ARD-P with AGOR, PAI ARD-P with SOC PHOB, PAI ALC with ETOH, PAI DRG with DRUG, PAI ANX with GAD, PAI SOM-S with SOMAT, PAI SOM-H with HYPOCH, and PAI MCE index with the PDSQ Total Score. The PDSQ BUL subscale did not have a matched PAI scale as none of the PAI scales assess the behavioral symptoms associated with Bulimia Nervosa.

2.4. Data analyses

Tables 1 and 2 present the mean and standard deviations for the PDSQ and PAI scales in our sample. Bivariate correlations were computed to explore the associations among the PDSQ scales and the validity criteria. First, we ran the correlations for the PDSQ scales and the matching PAI scales (See Table 5). Next, we calculated the correlations for the PDSQ scales and the life-event variables (See Table 6). Consistent with the nature of their underlying constructs, the PDSQ and PAI scales were used as continuous variables in all analyses.

Due to the differing sample sizes for our variables, special consideration was given to setting the criteria for identifying meaningful results. For the majority of the variables involved in the analysis, the n fell in a narrow range above 200 participants (n = 226–254). Only one variable, job loss due to interpersonal conflict in past five years (JOB), had a markedly smaller sample size (n = 107). Thus, two sets of statistical significance criteria were chosen. To ensure clinically meaningful results and to partially control for family-wise error, we chose a

[4] See Table 4 for the specific variables and their frequencies in the sample.

Table 1
Means and standard deviations for the PDSQ scales.

Subscale	Abbreviation	*M*	*SD*
Depression	DEP	8.26	5.01
Post-Traumatic Stress	PTSD	4.80	5.01
Bulimia	BUL	1.64	2.51
Obsessive Compulsive	OCD	1.27	1.79
Panic	PAN	2.08	2.52
Psychosis	PSYCH	.46	1.10
Agoraphobia	AGOR	2.31	2.80
Social Phobia	SOC PHOB	5.61	4.61
Alcohol	ETOH	.98	1.79
Drug	DRUG	.62	1.62
Generalized Anxiety	GAD	5.45	3.51
Somatization	SOMAT	1.18	1.36
Hypochondriasis	HYPOCH	.77	1.36
PDSQ Total	TOTAL	35.71	22.01

Sample size is constant for all variables, N = 254.

Table 2
Means and standard deviations for the PAI.

Scale and subscales	Abbreviation	*M*	*SD*
Depression	PAI DEP	69.31	16.07
Anxiety Related Disorders – Traumatic Stress	PAI ARD-T	63.00	16.32
Anxiety Related Disorders – Obsessive Compulsive	PAI ARD-O	52.89	12.17
Anxiety – Physical	PAI ANX-P	61.39	13.44
Schizophrenia – Psychotic Experience	PAI SCZ-P	47.25	11.11
Anxiety Related Disorders – Phobias	PAI ARD-P	56.56	12.71
Alcohol Abuse	PAI ALC	54.32	13.59
Drug Abuse	PAI DRG	54.83	14.37
Anxiety	PAI ANX	65.00	13.66
Somatic Complaint –Somatization	PAI SOM-S	57.68	12.68
Somatic Complaints – Health Concerns	PAI SOM-H	60.65	12.94
Mean Clinical Elevation	PAI MCE	58.56	9.06

Sample size is constant for all variables, N = 254.

Table 3
Frequencies of diagnoses provided by the referral source and/or medical record at the time of the evaluation.

	Primary diagnosis n = 254	Secondary diagnosis n = 202	Tertiary diagnosis n = 92
Depressive Disorders	103 (40.6%)	37 (14.6%)	10 (3.9%)
Bipolar Disorders	40 (15.7%)	7 (2.8%)	4 (1.6%)
Anxiety Disorders	50 (19.7%)	92 (36.2%)	22 (8.7%)
Psychotic Disorders	5 (2.0%)	3 (1.2%)	3 (1.2%)
Cognitive Disorders	17 (6.7%)	25 (9.8%)	13 (5.1%)
Substance-related Disorders	21 (8.3%)	20 (7.9%)	22 (8.7%)
Eating Disorders	–	6 (2.4%)	4 (1.6%)
Adjustment Disorders	8 (3.1%)	3 (1.2%)	1 (.4%)
Other Axis I Disorders	9 (3.5%)	8 (3.1%)	4 (1.6%)

202 (80%) participants had more than one diagnosis.

Table 4
Frequencies and categories of life space variables.

Life-event variables	Manner of coding and frequencies of each variable
Education (ED; n = 253)	Coded as a continuous variable in completed years of education: M = 14.84, SD = 2.65
Work (EMP; n = 248)	0 = unemployed (n = 126) 1 = employed (full or part time) or retired (n = 122)
Job Loss due to Interpersonal Conflicts in Past 5 Years (JOB; n = 107)	0 = no (n = 88) 1 = yes (n = 19)
History of Medical Problems (HX MED; n = 254)	0 = no (n = 103) 1 = yes (n = 151)
History of Abuse (HX AB; n = 226)	0 = no (n = 140) 1 = yes (n = 86)
History of Suicide Attempt (HX SA; n = 254)	0 = no (n = 205) 1 = yes (n = 49)
History of Auditory of Visual Hallucinations (HX HAL; n = 254)	0 = no history of auditory or visual hallucinations (n = 220) 1 = history of auditory and/or visual hallucinations (n = 34)
History of Psychiatric Hospitalization (HX PH; n = 254)	0 = never hospitalized (n = 145) 1 = hospitalized at least once (n = 109)

significance level of $r \geq 0.21$ (absolute value) for all variables but JOB. This criterion is in line with previous outpatient correlate studies using broadband measures of psychopathology that have shown a meaningful pattern of correlations for scales when an absolute $r \geq .20$ is used (e.g., Arbisi et al., 2008; Graham et al., 1999; Sellbom et al., 2006). With this criterion for a sample of 250, a correlation $r \geq 0.21$ is significant at p = 0.0008. The 95% CI for r = 0.21 is 0.09–0.33, which corresponds to an effect size range in the Cohen's d metric of 0.18–0.70. A second, more conservative criterion of $r \geq 0.30$ was adopted for JOB due to its smaller sample size. In a sample of 107 participants, r = 0.30 is significant at p = 0.001 with CI = 0.12–0.46 and corresponding effect sizes d = 0.24–1.03.

3. Results

Table 5 presents the correlations for the PDSQ and PAI. Of the 168 possible correlations, 123 were significant. However, the magnitude of the significant correlations varied widely ranging from .21 to .79, corresponding with small to large effect sizes ($r \geq .1$ and $r \geq .5$ respectively; Cohen, 1992). Importantly, all of the PDSQ subscales showed strong positive associations with their matched PAI counterparts, with eight of the subscale showing correlations of large effect sizes (i.e. $r \geq .5$; DEP, PTSD, PAN, PSYCH, ETOH, DRUG, GAD, and SOMAT). In addition, all of the PDSQ scales had a significant relationship with PAI MCE. Moreover, seven of the subscales had their second strongest correlation with this overall severity score on the PAI. Similarly, the PDSQ Total Score was significantly correlated with all but one of the PAI scales (i.e. PAI ALC).

Table 5
PDSQ correlations with the PAI scales.

	PAI DEP	PAI ARD-T	PAI ARD-O	PAI ANX-P	PAI SCZ-P	PAI ARD-P	PAI ALC	PAI DRG	PAI ANX	PAI SOM-S	PAI SOM-H	PAI MCE
DEP	**.79**	**.62**	**.36**	**.48**	**.35**	**.43**	.06	.17	**.57**	**.54**	**.39**	**.69**
PTSD	**.40**	**.72**	**.33**	**.48**	**.48**	**.38**	.06	.15	**.47**	**.47**	**.34**	**.57**
BUL	**.22**	.16	.10	**.26**	.16	.19	−.06	.06	**.27**	**.21**	.11	**.22**
OCD	**.34**	**.37**	**.46**	**.43**	**.41**	**.30**	−.01	.12	**.40**	**.32**	**.21**	**.45**
PAN	**.43**	**.54**	**.41**	**.66**	**.42**	**.42**	.07	**.29**	**.59**	**.48**	**.36**	**.61**
PSYCH	.20	**.28**	**.22**	**.26**	**.52**	**.22**	.10	.17	**.24**	.18	**.24**	**.36**
AGOR	**.43**	**.50**	**.27**	**.51**	**.40**	**.48**	.03	.15	**.53**	**.41**	**.32**	**.53**
SOC PHOB	**.42**	**.39**	**.37**	**.49**	**.37**	**.55**	.09	**.21**	**.56**	**.32**	**.26**	**.54**
ETOH	.03	.07	.09	.06	.18	.03	**.76**	**.30**	.06	.02	.09	**.30**
DRUG	.07	.12	−.02	.15	.12	.05	**.29**	**.63**	.11	−.01	.03	**.27**
GAD	**.49**	**.54**	**.41**	**.57**	**.34**	**.45**	.02	**.23**	**.67**	**.49**	**.35**	**.61**
SOMAT	**.41**	**.37**	**.27**	**.38**	**.32**	**.24**	.00	.07	**.34**	**.65**	**.53**	**.40**
HYPOCH	**.29**	**.32**	**.29**	**.40**	**.30**	**.25**	.03	.01	**.40**	**.45**	**.42**	**.39**
TOTAL	**.63**	**.71**	**.45**	**.68**	**.53**	**.55**	.12	**.29**	**.71**	**.60**	**.45**	**.78**

Bolded numbers indicate statistical significance at $r \geq .21$. PAI DEP = Depression full scale, PAI ARD-T = Anxiety Related Disorders-Traumatic Stress subscale, PAI ARD-O = Anxiety Related Disorders-Obsessive Compulsive subscale, PAI ANX-P = Anxiety-Physical subscale, PAI SCZ-P = Schizophrenia-Psychotic Experience subscale, PAI ARD-P = Anxiety Related Disorders-Phobias subscale, PAI ALC = Alcohol Abuse scale, PAI DRG = Drug Abuse, PAI ANX = Anxiety scale, PAI SOM-S = Somatic Complaints-Somatization subscale PAI SOM-H = Somatic Complaints-Health Concerns, PAI MCE = Mean Clinical Elevation. Sample size remains constant, N = 254.

Table 6
PDSQ correlations with Life Space variables.

	ED	EMP	JOB	HX MED	HX AB	HX SA	HX HAL	HX PH
DEP	−.16	**−.35**	.25	.06	**.26**	.18	.15	.17
PTSD	**−.31**	**−.24**	**.33**	.15	**.46**	.12	.17	.17
BUL	−.12	−.15	.19	.03	.11	.06	.08	.18
OCD	**−.25**	**−.22**	.27	.12	.20	.09	.16	.11
PAN	**−.33**	**−.27**	**.32**	.19	**.29**	**.21**	**.24**	**.29**
PSYCH	−.15	**−.27**	**.45**	.01	.15	.09	**.39**	.18
AGOR	**−.27**	**−.34**	**.42**	.14	**.30**	**.28**	**.25**	**.32**
SOC PHOB	−.16	**−.21**	.15	.06	.15	**.21**	**.23**	.15
ETOH	−.03	−.01	.26	−.03	.05	−.02	.08	.06
DRUG	−.12	−.12	**.32**	.04	.06	−.05	.12	.14
GAD	**−.22**	−.20	.22	.09	**.32**	.12	.16	.14
SOMAT	−.07	−.06	.26	**.27**	**.22**	.09	.14	.12
HYPOCH	−.12	−.14	.06	**.21**	.16	.04	.16	.11
TOTAL	**−.30**	**−.32**	**.37**	.15	**.36**	.20	**.27**	**.25**

Bolded text indicates significance at $r \geq .21$ for all variables except for job which was set at $r \geq .30$; ED = years of education; EMP = employment; JOB = job loss due to interpersonal conflict in past five years; HX MED = history of medical problems; HX AB = history of sexual or physical abuse; HX SA = history of suicide attempts; HX HAL = history of hallucinations; HX PH = history of psychiatric hospitalization. Sample size ranges, N = 106–254. See Table 4 for specific sample sizes and variable values.

Table 6 presents the correlations of the PDSQ scales with the life space variables. As can be seen, there are notably fewer significant correlations with the life space variables than there are with the PAI variables. In addition, the corresponding effect sizes are less robust, ranging from small to medium (i.e. $r \geq .1$ and $r \geq .3$ respectively; Cohen, 1992). Nevertheless, the Total Score and 11 of the 13 subscales all had at least one significant correlation to the life space variables. With regards to the life outcomes, five of the subscales as well as the PDSQ Total Score were negatively related to education (PTSD, OCD, PAN, AGOR, and GAD), and seven of the subscales and the Total Score were negatively correlated with employment status (DEP, PTSD, OCD, PAN, PSYCH, AGOR, and SOC PHOB). In addition, five of the subscales and the Total Score were positively correlated with recent job loss (PTSD, PAN, PSYCH, AGOR, and DRUG), and six subscales and the Total Score displayed a positive association with history of abuse (DEP,

PTSD, PAN, AGOR, GAD, and SOMAT). For variables related to psychiatric severity, four subscales (PAN, PSYCH, AGOR, and SOC PHOB) and the Total Score were associated with history of hallucinations, with PSYCH exhibiting the strongest relationship of medium effect size. Only AGOR, PAN, and SOC PHOB were related to a history of a suicide attempt. Likewise, only two of the subscales and the Total Score were significantly correlated with a history of psychiatric hospitalization (i.e., PAN, AGOR). In terms of the health status variable, both SOMAT and HYPOCH correlated with a history of medical problems.

4. Discussion

This study explored the relationship of the PDSQ to the PAI and objective life space variables. In general, our findings provided support for the construct validity of the PDSQ. The hypothesized patterns of relationships were found for all of the PDSQ scales with their matched PAI scales as well as for some of the life space variables. However, the results also uncovered a few incongruities between our hypotheses and the data obtained for the PDSQ, PAI, and the life space correlates. These inconsistencies may be indicative of limitations of our study or the complexity of the measured domains. However, they also underscore the importance of expanding the empirical support for the PDSQ.

Almost all of the PDSQ scales had their strongest association with their matched PAI scales supporting the convergent validity of the PDSQ. Moreover, the one unmatched PDSQ subscale, BUL, also displayed some significant correlations generally consistent with current literature examining comorbidities with eating disorders (Johnson et al., 2002; Kaye et al., 2004), although the effect sizes of these associations were small. In fact, the only two PDSQ subscales that did not show the expected pattern of results in relation to the PAI were PDSQ AGOR and SOC PHOB. Although these subscales evidenced strong correlations with their matched PAI scale (i.e. ARD-P) of medium and large effect sizes respectively, their strongest correlations were with PAI-ANX and MCE. The results may relate to differences in the scale construction of the PDSQ and PAI. Specifically, the PDSQ adopts the dichotomous DSM-IV diagnostic criteria and thus may reflect the significant symptom overlap inherent in the DSM (Watson et al., 2016). This is in contrast to the PAI's emphasis on non-overlapping subscales and construct validation framework (i.e. combination of theoretical and empirical development) rather than diagnostic underpinning (Morey, 1996). These findings may suggest that the PDSQ is helpful in quickly alerting clinicians/researchers to the general area of diagnostic difficulty. A longer measure like the PAI and/or an interview may then be used to provide more nuanced differentiation in symptomatology.

Overall diagnostic comorbidity was also evident in the high levels of intercorrelation between the PDSQ and PAI scales. Specifically, all but four of the PDSQ subscales significantly correlated with ten or more of the selected PAI scales. Similarly, the indicators of global severity of pathology (PDSQ Total Score and PAI MCE) were most strongly correlated with each other and also evidenced very strong correlations with the individual subscales. Although high intercorrelation could suggest limited discriminant validity of the individual subscales, it is likely related to the broad internalizing and externalizing factors that have been identified by researchers as two of the large spectra underlying psychopathology (Caspi et al., 2014; Hopwood and Moser, 2011; Krueger, 1999). Given this overlay in symptomatology, we would expect significant relationships among all the PDSQ and PAI subscales associated with internalizing disorders (e.g., DEP and ANX subscales for both the PDSQ and the PAI) as well as among the scales related to externalizing disorders (e.g., PDSQ ETOH and DRUG and PAI ALC and DRG scales). In addition, the lack of relationships between the PDSQ's subscales involving externalizing factors (i.e. ETOH and DRUG) with the PAI scales other than their externalizing equivalents and the MCE suggests good discriminant validity of the PDSQ for these two dimensions of psychopathology. Thus, our findings offer support for the construct validity for all PDSQ subscales and for the Total Score with the exception of the PDSQ BUL scale, for which our chosen comparison measure had no equivalent criterion. This constitutes a limitation of our study and an opportunity for future validation investigations of the PDSQ.

With regard to the selected life space variables, the PDSQ subscales exhibited fewer statistically significant relationships than with the PAI scales. Such an outcome would be anticipated due to method variance in obtaining data (i.e., self-report questionnaire versus clinical interviews and medical record review). In general, the relationships found between the PDSQ subscales and life space variables denoting positive and adverse life outcomes (i.e., education, employment, and recent job loss) are consistent with existing literature focused on associations among mental health issues, poor academic performance, and school dropout rates (Cornaglia et al., 2015), as well as the link between low socioeconomic status and prevalence of mental disorders (Friedli, 2009; Miech et al., 1999). Also in line with expectations, history of physical and/or sexual abuse, had its strongest correlation with PDSQ PTSD. Thus, the relationships found in our data connecting psychiatric symptomatology with educational attainment, employment, and history of abuse appear to further support criterion-related validity of the PDSQ.

Similarly, our analysis indicated the hypothesized correlation between history of medical problems and the PDSQ SOMAT and HYPOCH subscales. Given that both hypochondriasis and somatization disorder involve complaints of physical issues and that previous research has established a link between both disorders and increased utilization of medical healthcare services (Barsky et al., 2001; Hollifield et al., 1999; Simon, 1992; Smith, 1994), our results appear to further support the criterion validity of these PDSQ subscales.

Concerning the hypothesized correlations of the PDSQ and markers of psychiatric severity, the results were mixed. For example, as hypothesized, history of hallucinations showed its strongest relationship of a medium effect size with the PDSQ subscale assessing psychotic disorders, PSYCH. Moreover, significant positive associations with small to medium effect sizes were found between a history of psychiatric hospitalizations and PAN, AGOR, and Total Score. These correlations, however, only partially reflect the logical relationship between the likelihood of psychiatric hospitalization and the degree of severity of symptoms and impairment of functioning. Specifically, according to the statistics reported by the Agency for Healthcare Research and Quality (Heslin et al., 2015), most inpatient psychiatric hospital stays are connected to diagnoses of mood and psychotic disorders. Such a connection did not emerge in our data, as no significant correlations of DEP and PSYCH with history of psychiatric hospitalizations were found. Since approximately 43% of our sample had been hospitalized at some point prior to their assessment, and the majority of the participants received a diagnosis of a depressive disorder, the lack of significant relationships between the two may relate to the design/intention of the PDSQ. Specifically, in line with the PDSQ's purpose of being a brief-format screening measure for current diagnostic concerns, it may be expected that PDSQ subscales generally show greater convergent validity with life space variables related to more current concerns (e.g., employment) or those potentially having a longer lasting impact on the individual (e.g. history of abuse) as opposed to previous history of life space events such as psychiatric hospitalizations. Additionally, the lack of data on time of onset and stability of the participants' diagnoses of depressive disorders for our sample constrains our findings and makes definitive interpretations about this life space variable and its relationship with the PDSQ difficult.

In line with the previous result, our data failed to demonstrate statistically significant relationships between the majority of the PDSQ subscales and a history of suicide attempts. Although the prevalence of a previous suicide attempt among the participants was higher than in general population (i.e. 20% versus 12.6%; Center for Disease Control, 2015), of all the 13 PDSQ subscales, only PAN, AGOR, and SOC PHOB evidenced significant positive relationships with previous suicide

attempts and all three were small in effect. Current research reveals that any psychiatric diagnosis increases the risk of a suicide attempt, and certain types of disorders (e.g., mood disorders) represent much higher risk of suicidal ideation and suicidal behaviors (Kessler et al., 1999). Thus, the absence of an association between the PDSQ DEP scale and history of suicide attempts and only three significant correlations among the remaining PDSQ scales with this variable, including the PDSQ Total Score, is a cause for further inquiry by future validity studies focused on this instrument. However, it should also be noted that our findings may reflect the nature of the data collected for this variable. For instance, no information was collected on how recently prior suicide attempt(s) occurred. Thus, a reported attempt may not represent a current concern and no longer be reflective of the participant's present diagnostic profile captured by the PDSQ.

In summary, the results showed a few incongruities between our hypotheses and the found correlations. For example, the absence of relationships between some of our life space variables and their PDSQ counterparts should be re-examined in future studies with life space data selected to more closely match PDSQ's purpose of assessing current clinical presentation of the participants. However, despite the found inconsistencies, the pattern of correlations obtained for the PDSQ scales with the PAI scales and the life space variables was largely consistent with our expectations and past research. Thus, the present study provides further endorsement of the convergent, discriminant, and criterion validity of the PDSQ. In order to establish an evidence base for construct validity of a measure or a scale, multiple sources of evidence should be considered (Campbell and Fiske, 1959; Downing, 2003). While our study incorporated both an existing scale with abundant empirical backing and important life space data associated with both positive and negative life outcomes, other sources and/or methods need to be examined to achieve confidence in the interpretations derived from the PDSQ scores (Downing, 2003).

Therefore, future investigations should focus on establishing convergent validity for the PDSQ in different patient and non-patient populations (e.g., with differing prevalence of diagnoses) and with other established instruments assessing psychiatric symptomatology, especially one that incorporates eating pathology. Moreover, researchers should also provide more varied sources of convergent and discriminant validity evidence (e.g., other criterions, clinical utility concerns, and dissimilar measures focused on concepts not derived from psychiatric symptom domains). Including culturally and ethnically diverse individuals in participant samples is equally desirable in order to increase the generalizability of the results. Our sample was more or less homogenous in terms of race and ethnicity with 86% of participants endorsing “white” as their race. In spite of the existing racial and ethnic disparities in mental health care utilization, representation of ethnic minorities among the people who are seeking mental health care services continues to rise (Chapa, 2004). Accordingly, a validity evaluation of this measure should include investigations focused on different ethnic and racial groups.

Finally, our results hold implications for the PDSQ as a clinical as well as an empirical tool. As for the latter, because of the PDSQ's close ties to the DSM-IV diagnostic criteria, our findings highlight some of the issues of the current nosology included in the DSM-IV and continued in its latest iteration—DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition; American Psychiatric Association, 2013). Specifically, the extensive degree of intercorrelation of the PDSQ's DSM-IV-based subscales with many of the PAI scales underscores the level of comorbidity involved in the current system. Similarly, the PDSQ's difficulty in differentiating among specific anxiety-related disorders may be pointing to some loss of pathology-specific information caused by the DSM's forced dichotomization. Both of these issues are of interest to an emerging body of research exploring the underlying dimensions of psychopathology, as well as more parsimonious ways to describe and diagnose mental disorders (Caspi et al., 2014; Lengel et al., 2016; Watson et al., 2016). Given the PDSQ's apparent sensitivity to these concerns and its ability to model a wide range of psychopathology, it may be uniquely suited to assist with these investigations.

From a clinical perspective, our results provide an overall endorsement of the validity of the PDSQ as an efficient symptom screener that can assess psychopathology in a comprehensive manner and inclusively identify varied diagnostic concerns for individuals in need of mental health intervention. In addition, the PDSQ's multi-dimensional structure encompassing many symptom domains can greatly benefit treatment planning, as clinicians receive a more complete picture of the client's impairments. Importantly, since one of the primary goals of the PDSQ was to aid clinicians in accurately diagnosing all comorbid conditions, the changes in the latest version of the DSM may spur a need for a corresponding revision in the DSM-IV-based PDSQ subscales. Although many of the basic criteria for the former Axis I disorders have remained largely unchanged in the DSM 5, it is possible that the existing differences might affect the clinical utility as well as the construct validity of the measure.

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