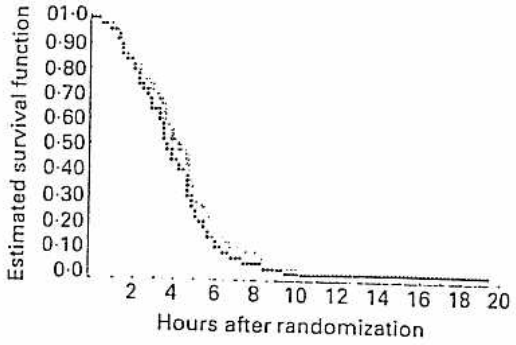

Fig. 2. Estimated probability of continuation in labour for each hour following randomization using Cox proportional hazards model (Amniotomy—closed circles, control—open circles.)

size = 0·7). The authors did not stratify for parity in the analysis. Two smaller studies by Wetrich (1970) and Laros (1972) reported similar results.

In that our study was designed to assess the effectiveness of a commonly used obstetrical procedure in a low risk population, it was surprising that the proportion of women who were eligible to participate was so small. The high number of exclusions was, in part, a function of the study having been performed in a tertiary care centre. There was a significant number of refusals by eligible patients, the reasons for which were not assessed. Because recruitment was completed in early labour, it was considered important that women be informed that they were free either to participate or not to participate. Our ability to compare study participants with eligible non-participants is limited by the few variables which were measured in the non-participant population. However, the available data suggest the two groups were similar.

In the course of the main analysis, differences between the treatment groups were identified on several co-variates. This is a cause for caution in the interpretion of the results. The comparisons regarding labour duration which are first presented are based on the unadjusted data. In general, the adjusted analyses served to support the conclusions which had been made on the basis of the unadjusted comparisons. With respect to the duration of labour, comparison of the unadjusted as well as the adjusted means provides no support for rejection of the null hypothesis. The analyses based on the survival curves further strengthen these conclusions.

The initial sample size calculation was based on the formula $n = 2(Z\alpha + Z\beta)^2/(\log_e E)^2$ where E is the effect size (Donnor, 1984). E = 0·7 was used for this calculation. This formula, which is designed for survival analyses and does not take into account the dispersion of the data, yielded a sample size requirement of 110 subjects/group. Because of limited resources, a power analysis was performed after 97 subjects had been recruited using a formula which takes into account both the dispersion of the data and the group means that had been attained. The calculation indicated that a power of 0·85 had been achieved for the specified effect size (0·7). It was decided to terminate the study at that point. It should be noted, however, that the power of the study to detect a 20% reduction in labour duration was only 0·55.

Many of the women in the current study were randomized when cervical dilatation was < 3 cm. This may partially explain the discrepancy between the findings of the current study and that of previous clinical trials when women were randomized later in labour. Further studies of this type should stratify by cervical dilatation at the time of randomization to assess whether any observed effect on labour duration is dependent on the cervical dilatation at the time of the procedure.

Several previous reports have suggested an association between early amniotomy and the occurrence of fetal heart rate decelerations. Schwarcz *et al.* (1973) found that after amniotomy over 20% of contractions produced type I

Table 6. Mean hourly rates of early, mild variable, severe variable, and late decelerations during the post randomization period for patients in the amniotomy and control groups

	Amniotomy		Control				
Type of deceleration	Mean	(SE)	Mean	(SE)	t	df	P
Early	0·41	(0·17)	0·49	(0·23)	0·32	90	0·750
Mild variable	1·10	(0·20)	1·50	(0·32)	1·23	90	0·220
Severe variable	1·61	(0·33)	2·83	(0·61)	1·73	90	0·084
Late	0·32	(0·22)	0·54	(0·40)	0·47	90	0·640

Table 7. Indicators of early neonatal status for infants born in the two study groups

	Amniotomy		Control		Fisher's exact
	Total no.	No. affected (%)	Total no.	No. affected (%)	P-value
Apgar 1 min < 6	47	7 (14·9)	50	9 (18·0)	0·787
Apgar 5 min < 8	47	2 (4·3)	50	5 (10·0)	0·437
Cord artery blood pH < 7·20	42	8 (17·0)	47	6 (12·0)	0·566
Assisted ventilation	47	6 (12·8)	50	6 (12·0)	1·000
Admitted to intensive care nursery	47	1 (2·1)	50	2 (4·0)	1·000

(early) decelerations, as opposed to 3% of contractions before membrane rupture.

Baumgarten (1976) reported the occurrence of early decelerations to be approximately doubled in women undergoing amniotomy relative to those labouring with membranes intact. Aladjem & Miller (1977) in an observational study found that spontaneous or artificial rupture of the membranes produced transient FHR abnormalities in approximately 25%, mainly early decelerations. By 15 min after rupture of membranes, there were no differences between groups in the occurrence of FHR abnormalities. Stewart *et al.* (1982), on the other hand, failed to show any differences between treatment groups in the rate of FHR tracing abnormalities, although the methods used to classify the tracings were not clearly specified.

With respect to the effects of early amniotomy on neonatal outcome, Schwarcz *et al.* (1982) found no association between the state of the membranes and Apgar score or neurological condition at 48 h of life. Baumgarten (1976) and Stewart *et al.* (1982) found no differences between groups in Apgar scores or in cord artery blood pH. Martell *et al.* (1976), in a study of 38 patients, reported early membrane rupture to be associated with a lower mean cord artery blood pH than occurred in infants of patients who laboured with intact membranes.

There are several advantages of the current study over previous studies with respect to indicators of fetal and neonatal status. The randomization process was carefully blinded, and the methods of classification of the FHR tracings was clearly specified. The dichotomous FHR tracing outcome selected as abnormal only those findings which could be of clinical significance to obstetrical decision making. As is appropriate in the analysis of management trials, the participants remained in their respective groups despite the post-randomization evolution of membrane status. Although this approach increases the risk of beta error, the absence of trends in the data suggests that it is unlikely that larger studies would demonstrate differences between treatment groups in fetal status or in neonatal outcomes.

In conclusion, the results of this study fail to support the longheld belief that early amniotomy is an effective method to reduce labour duration. A multicentre trial designed to further assess the effects of the procedure on labour progress is underway.

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Predictors of Community Discharge from a Geriatric Assessment and Rehabilitation Unit

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RÉSUMÉ

Cette étude examine les facteurs d'admission pouvant déterminer la réinsertion dans la communauté de patients ayant été admis au programme gériatrique d'évaluation et de rééducation (GARP). La régression logistique à inclusion hiérarchique a été utilisée afin de déterminer les facteurs de prédiction au sein d'un échantillon consécutif de 100 personnes, nécessitant des soins médicaux ou chirurgicaux en gériatrie, admises à un programme de rééducation de quatre à six semaines. Les principaux prédicteurs indépendants établissant le congé et pouvant être déterminés dès l'admission étaient: la possibilité de prescrire sans danger des médicaments, l'admission d'une personne provenant de la communauté, la valeur «GDS» et le soutien social. La possibilité de prescrire sans danger des médicaments peut constituer un prédicteur important, quoi qu'il ne soit pas souvent utilisé.

ABSTRACT

This study explored admission factors which predicted the successful return to the community of patients entering a Geriatric Assessment and Rehabilitation Program (GARP). A stepwise logistic regression technique was used to determine predictive factors from a consecutive sample of 100 medical or surgical geriatric patients admitted for a four to six week rehabilitation program. The significant independent predictors of discharge which could be determined at the time of admission were ability to safely medicate, admission from the community, GDS score and the number of supports. The ability to safely medicate may be an important but under-utilized predictor.

Introduction

Geriatric Assessment and Rehabilitation units are rapidly profilerating in

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many hospital settings.[1] They have been shown to improve patients' physical and psychological functioning,[2,3,4,5,6] and in some cases to prevent hospital readmission and to reduce mortality.[2,6] These units, however, are fairly costly to operate and access is often limited.[7]

Several authors have suggested that depending on the goals and objective of the program certain types of patients may benefit more than others and that the resources of these units would be better utilized if patients could be more appropriately matched.[6,8,9,10] Previous research has indicated that mental status, functional status and number of supports are important determinants for patients returning to the community.[4,5] This paper will explore these factors and others that could potentially predict which patients are likely to return to the community.

Methods

An evaluation study of the Geriatric Assessment and Rehabilitation Program (GARP) at the Colonel Belcher Hospital in Calgary was conducted from September 1989 to October 1990. One of the purposes of the evaluation was to determine how the patients' physical, psychological and functional status on admission predicted their re-entry into the community.

GARP

The Geriatric Assessment and Rehabilitation Program was established in 1987. It admits medical or surgical geriatric patients with recent deterioration in their functional ability (usually within the last three months) who would benefit from interdisciplinary assessment and a four to six week rehabilitation program and who otherwise would be a candidate for a long-term care facility. The unit excludes patients with acute illness, major psychiatric illness or long-standing dementia. Returning elderly patients to the community is a primary goal of this program.

The primary multidisciplinary team consists of a geriatrician, family physicians, nursing staff, physiotherapist, occupational therapists, recreational therapists, social worker, dietician and pharmacist. Consultants from medical and surgical sub-specialities as well as psychiatry, neuropsychology, and speech therapy are readily available.

Upon admission to the unit the patient is assessed by the team members who prepare a comprehensive care plan. At weekly meetings, the team discusses the patient's progress in individual and group treatments and plans his/her discharge. The patient and his/her family meet with the care team just prior to discharge. The average length of stay is 40 days. Median waiting period is 20 days.

To measure treatment effect, a trained research assistant administered the Katz Activities of Daily Living scale (ADL),[11] Geriatric Depression Scale (GDS),[12] Folstein Mini-Mental State Examination (MMSE),[13] within 48 hours of admission, at discharge, and at a three month post discharge home visit. Mobility was assessed on admission at three levels: independent; im-

paired, requiring the assistance of an aid or person for ambulation but able to transfer independently; impaired ambulation and requiring personal assistance for transfers.

The ability to safely medicate was determined by a pharmacy assessment conducted in the hospital. The patient was assessed as safe if there was a caregiver to administer the medications or if the patient was able to demonstrate on a pharmacy assessment the ability to self-medicate. The pharmacy assessment is standardized and validated assessment which assess a patient's knowledge, memory and functional abilities related to medication administration.[14] If there were any question of the patient's ability to self-medicate, the patient was assigned to a three week self-medication program in which the patient, monitored by the nursing staff, assumes increasing responsibility for the administration of his/her own medication.

Return to the community was defined as discharge to either the patient's own home or family home, senior apartment or lodge and remaining there for three months.

The following demographic information was obtained: age, sex, marital status, number and type of supports (patient indicated who, in the community, helped them and what kinds of help they received). Admitting source (community or post acute care), waiting period prior to admission, and number of medications were also noted.

Sample

One hundred and forty-eight consecutive patient admissions over a one year period were approached for the study. One hundred and twenty-seven were entered into the study. Patients excluded were either untestable, too ill to be tested within the 48 hour admission period or lived outside the study area and could not be tested at three months. Of the 127, eight refused follow-up after entering the study and 19 did not complete the program. There were three cases excluded due to missing data (see Table 1).

Statistical Methods

A backward stepwise logistic regression technique,[15] was used to determine which factors predicted discharge to the community.

The variables which were selected have been previously reported as being predictors in the literature or have been found to be useful in our clinical experience. These were sex; age; marital status; number of supports; waiting period prior to admission; number of medications; the ability to safely self-medicate; mobility; admitting source; admission Katz, MMSE and GDS scores.

Correlations between variables were determined using the Pearson correlation for parametric data and Spearman's rank correlation for nonparametric data. Data was analysed using BMDP statistical software.

Table 1
Study population

Total no. of patients	*148*
Reasons for Exclusion	
Unsuitable due to:	
Aphasia	3
Poor English skills	5
Inadequate comprehension	2
Severe illness	2
Previous inclusion in study	1
Lived outside of study area	8
Dropped out* due to:	
Medical complications	12
Non-completion of program	4
Researcher missing discharge	3
Patient refusal	8

*Three cases were omitted from the regression analysis due to missing date.

Table 2
Functional status of patients and no. of medications

Mean and S.E. Variable	*Admission*	*Discharge*	*Follow-up*
KATZ	2.27 ± .18	1.4 ± .17	1.8 ± .18
MMSE	23.5 ± .52	24.3 ± .48	23.9 ± .55
GDS	12.5 ± .69	10.9 ± .69	11.4 ± .65
NO. OF MEDS	4.0 ± .26	4.6 ± .25	4.4 ± .26
Mobility independent	33%		
Mobility partially dependent	33%		
Mobility dependent	34%		
Ability to safely medicate	75%		

Results

The average age was 79 (range 60–90). There were 62 females and 38 males. Twenty-eight per cent were married; 63 per cent were widowed, separated or divorced and 9 per cent were single. Sixty per cent were admitted post acute care and 40 per cent were admitted directly from the community.

In terms of diagnostic groups, 75 per cent were considered primarily medical; 15 per cent post surgical; and 10 per cent psychiatric. Sixty-eight per cent were discharged back to the community, 28 per cent to long-term care facilities and 4 per cent to acute care. Sixty-six per cent were still in the community at three month follow up.

Patients had an average of two supports. Sixteen per cent of their supports provided direct care while 95 per cent gave emotional support. Seventy-five per cent of patients were able to safely medicate.

Upon admission, 33 per cent of patients were independently mobile, 33 per cent were dependent but still able to transfer and 34 per cent were de-

Table 3
Determinants of return to the community of those completing the study

Predictor	*COEF*	*S.E.*	*t*	*p*	*OR*	*95% CI*
1. Admission from the community	1.05	.35	2.99	.004	8.2	2.0-11
2. No. of supports	.60	.33	1.82	.072		
3. Admission GDS	-.136	.047	-2.92	.004		
4. Ability to safely medicate	1.15	.35	3.28	.001	9.9	2.5-14
Constant	1.29	.95	1.37	.174		
Goodness fit chi sq (2*O LN (O/E) = 79.07 *d.f.*94 *p* = .865						

pendent and unable to transfer. Patients demonstrated small improvements in functional status and retained these improvements over time (Table 2). Two equations were derived: the first included patients who completed the program and had a three month follow-up visit and the second included all those who entered the study but subsequently dropped out, mainly due to illness or refusal of the follow-up visit.

The most significant predictors of discharge, in those that completed the study, in descending importance are: the ability to safely medicate; admission from the community; GDS score; and the number of supports. There were no significant first order interactions between these variables (Table 3).

Many of the variables were significantly correlated with each other due to the large sample size but the correlation coefficients were low except for mobility and ADL = 0.69 (Table 4). To assess possible multicollinearity of these variables, two separate equations, one including mobility (excluding ADL) and one including ADL (excluding mobility) were performed. Multicollinearity was not a problem.

If all persons including the drop-outs are analysed, the predictors remain the same except that ADL replaced the number of supports as a significant predictor. There were no significant first order interactions (Table 5).

Discussion

The advantages of examining those factors which predict community discharge are two-fold. The identification of actors which prevent discharge can result in new rehabilitation strategies to overcome these obstacles. For example, if safe medication administration is the only impediment to returning to the community, then creative solutions may be developed to deal with this problem.

The second advantage is the selection and priorization of patients. Most programs informally screen for high risk patients. Rubenstein et al.[2] excluded patients who could not perform more than three ADL functions, had severe dementia and lacked a social support system. Applegate et al.[6] also excluded patients with severe mental impairment and inevitable nursing

Table 4
Correlations of predictors of community discharge

	D/C-COMM	SEX	AGE	ADM-COMM	ADM ADL*	MMSE
D/C-COMM	1.00	-.01 ns	-.06 ns	0.39 $p=.001$	.29 $p=.004$	0.27 $p=.007$
AGE	-.06 ns	.25 $p=.01$	1.00	-.13 ns	-.18 ns	-.24 $p=.02$
ADM.-COMM	.39 $p=.000$	.09 ns	-.13 ns	1.0	.34 $p=.001$	.31 $p=.002$
NO. OF SUPPORTS	.25 $p=.01$	.06 ns	.04 ns	.03 ns	.12 ns	.04 ns
ADM ADL*	.29 $p=.004$	.14 ns	-.19 ns	.34 $p=.001$	1.0	.32 $p=.001$
ADM MMSE	.27 $p=.007$	.13 ns	-.24 $p=.02$	.31 $p=.002$	.32 $p=.001$	1.0
ADM GDS	-.30 $p=.002$	-.02 ns	.00 ns	.02 ns	-.02 ns	-.15 ns
WAIT PERIOD	.03 ns	-.05 ns	-.1 ns	.23 $p=.02$	.13 ns	.18 ns
SAFELY MED.	.46 $p=.001$	-.12 ns	-.25 $p=.01$	.28 $p=.001$	.32 $p=.001$	.34 $p=.000$
ADM MEDS	.10 ns	.00 ns	-.16 ns	-.03 ns	.08 ns	.14 ns
MOBILITY	.24 $p=.01$	.11 ns	-.11 ns	.31 $p=.001$	.69 $p=.001$	.24 $p=.02$

	ADM-GDS	LENGTH OF STAY	NO.-MEDS.	SAFELY MED.	MOBILITY
D/C-COMM	.30 $p=.002$	-.37 $p=.001$	.02 ns	.46 $p=.001$	.24 $p=.01$
AGE	.005 ns	-.04 ns	-.23 $p=.02$	-.25 $p=.01$	-.11 ns
ADM.-COMM	.02 ns	-.37 $p=.001$	-.02 ns	.28 $p=.005$	.31 $p=.001$
NO. OF SUPPORTS	-.13 ns	-.08 ns	-.07 ns	.13 ns	.13 ns
ADM ADL*	-.02 ns	-.39 $p=.001$	.00 ns	.32 $p=.001$	.69 $p=.001$
ADM MMSE	-.14 ns	-.06 ns	.15 ns	.34 $p=.004$	.24 $p=.007$
ADM GDS	1.0	.11 ns	.15 ns	-.02 ns	-.03 ns
WAIT PERIOD	.15 ns	-.06 ns	.12 ns	.03 ns	.12 ns
SAFELY MED.	-.02 ns	-.18 ns	.20 $p=.05$	1.0	.24 $p=.02$
ADM MEDS	.14 ns	.02 ns	.15 ns	.34 $p=.001$	.06 ns
MOBILITY	-.03	-.31	-.05	.24	1.0

*ADM ADL = "Independence in ADL".
As the Katz ADL uses an inverse scoring procedure (increase in ADL score = decrease in independence) the term "independence of ADL: is used to keep the direction of the ADL correlations in line with the other measures.

Table 5
Determinants of return of the community of all subjects entered into study including drop-outs

Predictor	*COEF*	*S.E.*	*t*	*p*	*OR*	*95% CI*
1. Admission from the community	1.4	.53	2.66	.009	4.1	2.4-6.9
2. ADL	-0.31	1.35	-2.26	.026		
3. GDS	-0.120	.038	-3.20	.0018		
4. Ability to safely medicate	2.09	.59	3.54	.0006	8.1	4.5-14.6
Constant	0.911	.761	1.2	0.2326		

Goodness fit chi sq (2*O LN (O/E) = 108.9 *d.f.*118 $p = .713$

home placement. They concluded that patients at moderate rather than high risk of nursing home placement had the greatest improvement with respect to mortality and functional status. Rehabilitation programs should target those patients who would best match their goals and resources. Realistic and clear establishment of goals prior to admission is important. The rehabilitation goals for patients returning to the community are different than those clearly destined to nursing home placement. It may be necessary to separate and stratify rehabilitation programs based on patients' discharge prospects.

Many of the characteristics of patients who returned to the community in this study are not surprising. Functional and mental status are well-established predictors.[3,4,10,16] Narain et al.[17] in a prospective multivariate study of elderly patients. found that low functional and mental status, living location, and type of caregiver were most predictive of nursing home admission. Functional status was a stronger predictor of length of stay, mortality and nursing home placement than the principal admitting diagnosis. In the present study, functional status as measured by ADL was only a significant predictor when those patients who did not complete the study, mainly due to illness, were included. Not surprisingly, their mean functional status (ADL) was lower than the group who did (2.7 vs 2.3).

Mental status did not appear as an independent predictor. However, it was correlated with the ability to safely medicate and admission from the community. Mental status has not been shown to consistently improve with admission to a geriatric unit. [2,4,6] The number of cases of reversible cognitive impairment may actually be quite small.[18] Moderate to severe impairments in mental status without any reasonable prospect for reversal may be a reasonable exclusion criterion for programs which aim to return patients to the community.

Admission from the community, rather than post-acute care, strongly predicted return to the community. This finding may suggest the importance of earlier intervention for the geriatric patient before his/her condition has deteriorated to the point of requiring an acute care admission. The collapse of community support systems may also be circumvented by earlier intervention.

A patient who returns home will have to have a reasonable functional level for self care, or, if not, a support system to assist with that care. The number of supports is usually a predetermined factor but should be given consideration at the time of admission. In this study the number of supports predicted eventual return to the community. In general, the lack of a caregiver or spouse increases the risk of institutionalization.[4,19,20]

A factor which may not be recognized and given due consideration is depression.[5] Depression was a relatively independent predictor of patients not returning to the community, being only correlated with Mini-Mental Status scores. The prevalence of depression has been estimated to be 15 per cent in the elderly.[21] Depressed, lonely and isolated elderly patients may not be able to return to the community despite a reasonable functional level. Depression can reduce the motivation to participate in rehabilitation programs as well. Because of the significant delay in the response of depression to treatment and its effect on mental status, early identification and treatment of depression is important.

Instrumental Activities of Daily Living (IADL) may be under-utilized predictors. Wachtel et al.[22] examined IADL as determinants of community discharge. Using the ability to do heavy housework independently or climb stairs as predictive measures, he found that 97 per cent of patients who could perform either of these activities were discharged back to the community. IADL by their very nature often require intact cognitive skills and functional independence. In the community, the performance IADL often will determine a person's capability for independent living. The use of IADL's rather basic functions may simplify testing and more accurately reflect outcomes.

The only IADL function measured in this study was ability to safely medicate. It has not been studied extensively as a predictor of hospital discharge although it is a definite factor in decision-making about discharge. Medication misadventures are a common cause of hospitalization in the elderly.[23,24]

The ability to safely medicate is a two-fold variable. It includes situations where the patient can administer his/her own medication safely him/herself or, if not, has assistance to administer them. This definition was used as it corresponds more closely to the clinical reality. The ability to self-medicate may be one of the few instrumental activities of daily living that can be easily measured in a hospital setting. Programs have now been designed to teach patients to self-medicate. Whether such programs are effective still remains to be demonstrated. Other instrumental activities may also be predictive of discharge but they have not been tested. Driving, shopping, and financial management might be potential predictors.

The present study has several limitations. The generalizability of the findings is unknown. The manpower and programming of various geriatric assessment units is not uniform across the country. The treatment outcomes and discharge to the community may also reflect the strengths and weaknesses of individual teams and the availability of community programs and supports. This was an exploratory study: the predictive value of the model has not been validated in a prospective study. Patients were only fol-

lowed for a three month period. Whether the model is valid for longer periods has not been demonstrated.

Conclusion

The determinants of discharge from geriatric assessment and rehabilitation program to the community are multi-factorial. This study suggests that many may be determined prior to admission, thus improving patient selection and resource allocation. Highlighted in this study were the importance of the ability to self-medicate, psychological state and community supports.

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The Beck Anxiety Inventory: Psychometric Properties in a Community Population[1]

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This study presents data on the norms and psychometric properties of the Beck Anxiety Inventory (BAI), using a sample of 225 community adult volunteers. Maximum-likelihood confirmatory factor analyses of previously published models of the BAI: a two-factor model and a five-factor model, showed that the fit of each model was unacceptable. Also, the fit of the single-factor model was poor. Exploratory principal-components analyses with varimax and oblique rotations suggested four BAI components within this sample. Satisfactory levels of reliability were established for the BAI subscales. Finally, the relations between the BAI total and subscale scores and a related measure of anxiety and with another self-report measure of psychological distress were examined.

KEY WORDS: Beck Anxiety Inventory; norms; factor analyses.

INTRODUCTION

In 1988, Beck, Epstein, Brown, and Steer described the development and initial psychometric properties of the Beck Anxiety Inventory (BAI). This 21-item self-report inventory was designed to assess the severity of anxiety symptoms in adults and adolescents. In their initial psychiatric outpatient sample (n = 160), Beck *et al.* (1988) identified two factors for the BAI: somatic and subjective anxiety/panic. The factors showed good internal consistency, test–retest reliability, and convergent/divergent validity.

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Recently, Borden, Peterson, and Jackson (1991) administered the BAI to 293 introductory psychology college students and identified five factors: subjective fear and anxiety, somatic nervousness, neurophysiological, muscular/motoric, and respiration. Unfortunately, the coefficients alpha were not reported for the factor scales. But, in a second sample of 40 undergraduates, Borden *et al.* (1991) reported moderate and significant correlations between the BAI and several physiological measures and with subjective distress. Results provided support for the concurrent validity of the BAI.

To date, there has been no published study of the norms and psychometric properties of the BAI in a community nonpatient adult sample, despite the noted relevance of nonclinical normative data to clinical assessors (see Kendall & Grove, 1988).

The present study presents data concerning the norms and various psychometric properties of the BAI in an adult community sample. Specifically, the factor structure and internal consistency reliability of the BAI were evaluated. Finally, we examined the relations between the BAI and a related measure of anxiety as well as with a self-report measure of psychological distress.

METHOD

Subjects

Subjects were 225 adult volunteers: 66 men (age: M = 36.2 years, SD = 11.9 years; range, 20–72 years) and 159 women (age: M = 37.1 years, SD = 12.0 years; range, 20–74 years) recruited from a moderate-size Midwestern community. The sample was predominantly White and included individuals with a range of background education: partial junior high to graduate studies. Sixty-four percent were married and 36% were unmarried (including those never married, divorced, separated, and widowed). Each subject provided informed consent to participate.

Measures and Procedure

Each participant completed a packet of self-report measures that included a background information questionnaire, the BAI, and two other measures with established reliability and validity.

The Beck Anxiety Inventory (BAI; Beck et al., *1988).* The BAI consists of 21 items that assess the severity of anxiety. Subjects rate each item, using a 4-point scale: 0 (*not at all*) to 3 (*severely, I could barely stand it*). Anxiety severity is the total raw-score sum across all 21 items. The total scores range from 0 to 63.

The Cognitive-Somatic Anxiety Questionnaire (CSAQ; Schwartz, Davidson, & Goleman, 1978). The CSAQ is a 14-item self-report measure of the cognitive and somatic symptoms of anxiety. Each item is rated on a 5-point scale ranging from 1 (*not at all*) to 5 (*very much*). Satisfactory reliability and validity have been established for the CSAQ. This measure was included in 158 (68.7%) of the questionnaire packets.

The Brief Symptom Inventory (BSI; Derogatis, 1992). The BAI is a short form of the Symptom Checklist 90R (SCL-90R; Derogatis, 1983). This 53-item inventory is a measure of current symptoms of psychological distress. Each item is rated on a 5-point scale in Likert format ranging from 0 (*not at all*) to 4 (*extremely*). Separate subscales can be scored that measure nine dimensions, as well as three global indices of psychological distress.

Residential areas within each of the four zones of the Cedar Falls community were randomly selected from the city zone map provided by the Department of Planning and Zoning for questionnaire distribution. Undergraduate senior research assistants distributed (door-to-door) the questionnaire packets. The completed questionnaires were collected within 48 hr of administration. Of the 230 homes contacted, only 5 returned incompleted questionnaires to the research assistants. No data regarding income and occupation were obtained.

RESULTS AND DISCUSSION

Factor Analyses

Maximum-likelihood confirmatory factor analyses (LISREL 7; Joreskog & Sorbom, 1990) were used to assess the generalizability of the two-factor model (Beck *et al.*, 1988) and the five-factor model (Borden *et al.*, 1991) to our community adult data. Additionally, the adequacy of the BAI as a unidimensional self-report measure of anxiety was assessed by forcing all items to load on a single factor.

Because of problems related to the use of the chi-square statistic, such as sensitivity to large sample size (see Cole, 1987), we used three practical measures of fit: the goodness-of-fit (GFI, values greater than .90), the adjusted goodness-of-fit (AGFI, values greater than .80), and the root mean square residual (RMS, values less than .10) to evaluate the adequacy of each model.

The GFI = .72, the AGFI = .65, and the RMS = .12 values for the two-factor model were not an adequate fit to the observed data. Similarly, for the one-factor model, the GFI = .56, and the AGFI = .48 values

suggested that this model did not fit the data adequately. Finally, all indices of fit also suggested that the five-factor model (GFI = .81; AGFI = .75; RMS = .08) approached but did not provide a satisfactory fit to the data for our sample.

Because of the poor solutions obtained, exploratory principal-components analyses with varimax and oblique rotations were conducted to explore the factor structure of the BAI in this sample. A high Kaiser–Meyer–Olkin ratio (KMO = .90) suggested that the principal-components analysis was appropriate. Both the eigenone criterion and the scree plot suggested a four-factor model. Items loading .45 or above on a primary factor and not on another factor were retained. Varimax and oblique rotations resulted in similar results. Results of the varimax procedure are shown in Table I. The four factors accounted for 64.6% of the total variance.

Reliability and Subscale Correlations

Coefficients alpha for the BAI total and subscale scores were high and acceptable (see Table II). All item-subscale correlations (values were .70 or greater) were also adequate. The pattern of correlations among the subscales was similar for men and women. For men, however, the alpha value for the panic factor was low.

Norms and Subscale Validity

Normative data for the study sample are presented in Table II. Initial analysis (see Table II) showed negative and significant relationships between age and scores on the BAI subjective ($r = -.25$, $p < .01$), autonomic ($r = -.17$, $p < .05$), and panic ($r = -.14$, $p < .05$) subscales, suggesting that younger subjects may score higher than older subjects on these subscales. A 2 (Gender) × 4 (Subscale) multivariate analysis of covariance (covariate, age) showed significant differences between the genders [$F(4,219) = 3.17$, Hotelling's $T^2 = .06$, $p < .01$]. As shown in Table II, women scored significantly higher than men on the panic ($t = 2.77$, $p < .01$) and autonomic ($t = 2.84$, $p < .01$) subscales as well as on the BAI total score ($t = 2.58$, $p < .05$).

Finally, descriptive discriminant analysis, undertaken to examine gender differences across the 21 items, showed that 9 of the 21 items (see Table I) were useful in accounting for subgroup separation.

Table I. Sorted Rotated Factor Loadings and Communalities (h^2) from Principal Components

Item		Factor loading 1	2	3	4	h^2
Factor 1.	Subjective					
10.	Nervous	.83	.09	.21	.01	.74
17.	Scared[a]	.79	.12	.18	.15	.70
5.	Worst happening[a]	.78	.18	.14	.07	.67
14.	Losing control	.77	.21	.15	.15	.68
4.	Unable to relax	.75	.13	.22	−.03	.63
9.	Terrified[a]	.75	.23	.12	.20	.66
Factor 2.	Neurophysiological					
13.	Shaky	.19	.78	.27	.11	.73
8.	Unsteady[a]	.28	.76	.24	.11	.72
3.	Wobbliness	.20	.75	.14	.02	.63
19.	Faint[a]	−.01	.73	.20	.18	.61
6.	Dizzy	.09	.71	.15	.23	.59
1.	Numbness	.14	.70	−.05	−.06	.51
12.	Trembling	.25	.69	.40	.09	.71
Factor 3.	Autonomic					
20.	Face flushed[a]	.21	.23	.78	.08	.72
2.	Feeling hot[a]	.12	.23	.77	.09	.67
21.	Sweating	.27	.28	.68	.13	.63
18.	Indigestion	.34	.08	.52	.01	.39
Factor 4.	Panic					
11.	Choking	−.05	−.02	.19	.80	.68
15.	Breathing	.17	.32	.23	.75	.75
16.	Dying[a]	.32	.14	−.23	.70	.66
7.	Heart pounding	.37	.25	.35	.38	.47
Eigenvalue		8.12	2.42	1.60	1.41	
Variance (%)		38.7	11.5	7.6	6.7	

[a] Item discriminated between male and female subjects.

Table II. Means, Standard Deviations, Alpha Values, and Subscale Intercorrelations

Variables	BAI subscales 1	2	3	4	BAI total	M	SD	α
Men (n = 66)								
1. Subjective	1.00					4.27	3.76	.86
2. Neurophysiological	.21	1.00				1.83	2.69	.86
3. Autonomic	.27[a]	.38[b]	1.00			1.77	2.01	.75
4. Panic	.34[b]	.32[b]	.33[b]	1.00		.96	1.41	.58
5. BAI total	.77[b]	.68[b]	.65[b]	.61[b]	1.00	8.83	6.92	.85
Women (n = 159)								
1. Subjective	1.00					5.18	4.81	.91
2. Neurophysiological	.49[b]	1.00				2.86	4.19	.90
3. Autonomic	.57[b]	.55[b]	1.00			2.85	2.79	.78
4. Panic	.48[b]	.47[b]	.39[b]	1.00		1.77	2.22	.71
5. BAI total	.85[b]	.82[b]	.78[b]	.68[b]	1.00	12.66	11.20	.92
Total sample (N = 225)								
1. Subjective	1.00					4.92	4.54	.90
2. Neurophysiological	.45[b]	1.00				2.56	3.84	.89
3. Autonomic	.52[b]	.53[b]	1.00			2.53	2.63	.78
4. Panic	.46[b]	.46[b]	.40[b]	1.00		1.53	2.05	.70
5. BAI total	.83[b]	.80[b]	.76[b]	.68[b]	1.00	11.54	10.26	.92
6. Age	−.25[b]	−.04	−.17[a]	−.14[a]	−.20[b]	36.91	11.98	—
7. Gender	.09	.12	.18[a]	.18[a]	.17[a]	—	—	—

[a] $p < .05$.
[b] $p < .01$.

Relation of the BAI to the CSAQ

Zero-order and partial correlation coefficients were computed between the BAI and the CSAQ subscales. All zero-order correlations between the BAI subscales and the CSAQ-Cognitive (see Table III) were positive and significant for men, women, and the total sample. Similarly, for women and the total sample, all BAI subscales correlated positively and significantly with the CSAQ-Somatic. But for men, only the BAI neurophysiological and autonomic subscales correlated with the CSAQ-Somatic.

When we statistically controlled for general psychological distress (Global Severity Index; GSI), the magnitudes of these correlations dropped slightly to markedly for both genders. Also, for both genders and total sample, partialling out GSI had the greatest impact on the relationships between the BAI subscales and the CSAQ-Cognitive. Only the BAI subjective remained correlated significantly with the CSAQ-Cognitive for women and the total sample. Further examination of the relationships between the CSAQ-Somatic and the BAI subscales showed that, for men, the CSAQ-Somatic maintained its significant relationships with the neurophysiological and autonomic subscales when GSI was covaried. For women, the CSAQ-Somatic remained correlated with only two of the four BAI subscales. Results provide initial support for the concurrent validity of the BAI in this sample.

Relation of the BAI to Psychological Distress

Pearson product-moment correlation coefficients were computed for the total sample and for men and women separately. Results are presented in Table IV. For women, all four BAI subscales significantly correlated with the GSI and all nine BSI subscales. These findings do not support the specificity of the BAI with the BSI in this subsample. For the men, the BAI subjective subscale correlated positively and significantly with the GSI and all nine BSI subscales. Further examination of the pattern of correlations showed that the BAI neurophysiological, autonomic, and panic subscales correlated as highly with the BSI anxiety subscale as with the remaining BSI subscales. Similarly, the pattern of correlations between the BAI and the BSI does not provide strong evidence for the specificity of the BAI for men.

Table III. Correlations (Zero-Order and Partial) of the BAI with the CSAQ

Variable	BAI subscales				BAI total score
	Subjective	Neurophysiological	Autonomic	Panic	
Men (n = 54)					
CSAQ-Cognitive	.44[c]	.33[c]	.30[c]	.33[c]	.51[c]
Partial r[a]	.15	.24	.16	.04	.26[b]
CSAQ-Somatic	.17	.31[b]	.44[c]	.24	.38[c]
Partial r[a]	.00	.26[b]	.39[b]	.12	.29[b]
Women (n = 104)					
CSAQ-Cognitive	.57[c]	.27[c]	.32[c]	.39[c]	.52[c]
Partial r[a]	.32[c]	−.05	.03	.08	.18
CSAQ-Somatic	.38[c]	.49[c]	.24[c]	.44[c]	.50[c]
Partial[a]	.12	.33[c]	−.01	.24[c]	.27[c]
Total subsample (n = 158)					
CSAQ-Cognitive	.52[c]	.29[c]	.32[c]	.36[c]	.51[c]
Partial[a]	.25[c]	.07	.11	.10[c]	.23[c]
CSAQ-Somatic	.31[c]	.43[c]	.31[c]	.38[c]	.46[c]
Partial[a]	.11	.32[c]	.17[b]	.23[c]	.30[c]

[a] Controlling for general psychological distress (GSI).
[b] $p < .05$ (two-tailed test).
[c] $p < .01$ (two-tailed test).

Table IV. Correlations of the BAI with the Brief Symptom Inventory (BSI)[a]

	BAI Subscale									
	SOM	OC	INT	DEP	ANX	HOS	PHOB	PAR	PSY	GSI
Men (n = 66)										
Subjective	.39[c]	.39[c]	.50[c]	.63[c]	.69[c]	.50[c]	.42[c]	.49[c]	.60[c]	.68[c]
Neurophysiological	.44[c]	.27[b]	.25[b]	.22	.16	.23	.02	.15	.16	.26[b]
Autonomic	.44[c]	.43[c]	.19	.27[b]	.23	.33[c]	.12	.29[c]	.19	.35[c]
Panic	.37[c]	.42[c]	.33[c]	.28[b]	.37[c]	.13	.25[b]	.34[c]	.24[b]	.39[c]
BAI Total	.59[c]	.53[c]	.49[c]	.57[c]	.58[c]	.48[c]	.32[c]	.48[c]	.49[c]	.66[c]
Women (n = 159)										
Subjective	.55[c]	.61[c]	.57[c]	.70[c]	.72[c]	.58[c]	.56[c]	.61[c]	.71[c]	.71[c]
Neurophysiological	.66[c]	.44[c]	.40[c]	.50[c]	.48[c]	.35[c]	.47[c]	.45[c]	.46[c]	.51[c]
Autonomic	.65[c]	.51[c]	.50[c]	.54[c]	.55[c]	.44[c]	.45[c]	.49[c]	.52[c]	.58[c]
Panic	.48[c]	.39[c]	.39[c]	.49[c]	.46[c]	.36[c]	.45[c]	.45[c]	50[c]	.49[c]
BAI Total	.74[c]	.63[c]	.60[c]	.72[c]	.72[c]	.56[c]	.62[c]	.64[c]	.71[c]	.74[c]
Total sample (n = 225)										
Subjective	.50[c]	.55[c]	.54[c]	.67[c]	.68[c]	.56[c]	.50[c]	.57[c]	.68[c]	.69[c]
Neurophysiological	.59[c]	.39[c]	.35[c]	.42[c]	.38[c]	.32[c]	.34[c]	.38[c]	.40[c]	.44[c]
Autonomic	.58[c]	.47[c]	.40[c]	.46[c]	.43[c]	.41[c]	.33[c]	43[c]	.44[c]	49[c]
Panic	.44[c]	.37[c]	.35[c]	.42[c]	.39[c]	.30[c]	.36[c]	.42[c]	.44[c]	.43[c]
BAI Total	.68[c]	.58[c]	.54[c]	.66[c]	.63[c]	.53[c]	.51[c]	.59[c]	.65[c]	.68[c]

[a] SOM, somatization; OC, obsessive–compulsive; INT, interpersonal sensitivity; DEP, depression; ANX, anxiety; HOS, hostility; PHOB, phobic anxiety; PAR, paranoid ideation; PSY, Psychoticism; GSI, general severity index.
[b] $p < .05$ (two-tailed test).
[c] $p < .01$ (two-tailed test).

In summary, the present study presents preliminary data on the norms and psychometric properties of the BAI for a sample of community-dwelling adults. Our normative data may be useful for interpreting meaningfully the responses of clinically anxious subjects (see Kendall & Grove, 1988).

Results of the confirmatory and exploratory factor analyses suggest that the factor structure of the BAI in our sample may be different from those reported for a mixed diagnosed sample of psychiatric outpatients (Beck *et al.*, 1988) and college students (Borden *et al.*, 1991). The extracted factors showed acceptable levels of reliability. Age correlated significantly with the BAI subjective, autonomic, and panic subscales, suggesting consideration of this factor in the use of the BAI. Also, two of the BAI subscales were useful in differentiating between male and female subjects in this sample. For the total sample, the mean score (M = 11.54) on the total BAI was slightly higher than those reported by Borden *et al.* (1991) for the college sample (M = 10.75). The mean score for Beck and co-workers' (1988) outpatient psychiatric sample (M = 22.35) was higher than the mean score obtained in our sample. Consistent with the findings of previous studies, female subjects scored significantly higher than male subjects on the total BAI.

Correlations between the BAI subscales and a related measure of anxiety provided initial evidence for the concurrent validity of the BAI. However, correlations between the BAI subscales and a self-report measure of psychological distress suggested that the symptoms of anxiety reported by men or women were difficult to differentiate from their self-reports of general psychological distress. The lack of specificity of the BAI with the BSI may relate in part from the moderate to high correlations found (range, r = .43 to .77) among the nine BSI subscales in this study. Also, as one reviewer pointed out, there is additional evidence that suggests that the SCL-90R subscales lack discriminant validity (e.g., see Cyr, Doxey, & Vigna, 1988). Because the BSI items were drawn directly from the SCL-90R (see Derogatis, 1992), the BSI subscales may lack discriminant validity. Future researchers might examine the relationships between the BAI and validated measures that assess specific psychopathology such as the State-Trait Anxiety Inventory (STAI, Form Y; Spielberger, 1983) and the Cognition Checklist (CCL; Beck, Brown, Steer, Eidelson, & Riskind, 1987) to assess the specificity of the BAI. In general, our findings suggest that the BAI is a promising multidimensional measure of anxiety in this sample.

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