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Latent Class-Derived Subgroups of Depressive Symptoms in a Community Sample of Older Adults: The Cache County Study

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Abstract

Objective—We sought to identify possible subgroups of elders that varied in depressive symptomatology, and to examine symptom pattern and health status differences between subgroups.

Methods—The Cache County Memory Study is a population-based epidemiological study of dementia with 5,092 participants. Depressive symptoms were measured with a modified version of the Diagnostic Interview Schedule-Depression. There were 400 non-demented participants who endorsed currently (i.e. in the past 2 weeks) experiencing at least one of three “gateway” depressive symptoms and then completed a full depression interview, responses to all nine current depressive symptoms were modeled using Latent Class Analysis (LCA).

Results—Three depression subgroups were identified: a significantly depressed subgroup (62%), with the remainder split evenly between a subgroup with low probability of all symptoms (21%) and a subgroup with primarily psychomotor changes, sleep symptoms and fatigue (17%). LCA derived subgroups of depressive symptoms and DSM-IV depression diagnostic group were non-redundant. Age, gender, education, marital status, whether early vs. late onset, number of episodes, current episode duration, and functional status were not significant predictors of depression subgroup. The first subgroup was more likely to be recently bereaved and had less

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Conflicts of Interest

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physical health problems whereas the third subgroup were less likely to be using antidepressants, compared with the second subgroup.

Conclusions—There are distinct subgroups of depressed elders, which are not redundant with the DSM-IV classification scheme, offering an alternative diagnostic approach to clinicians and researchers. Future work will examine whether these depressive symptom profiles are predictive of incident dementia and earlier mortality.

Keywords

subgroups of depressive symptoms; latent class analysis; classification schema

Introduction

According to the Federal Interagency Forum on Aging-Related Statistics (2008), about 11 percent of male and 17 percent of female adults, age 65 and over, have reported depressive symptoms. However, Steffens et al. (2009) report on findings from the Aging, Demographics and Memory Study where the female predominance of depression was not observed (10.19% for men, 11.44% for women). Geriatric depression is heterogeneous in appearance (Sneed et al., 2008), with several approaches to capturing this heterogeneity. Epidemiological studies often use symptom counts from self-report instruments such as the Geriatric Depression Scale (GDS; Yesavage et al., 1983), the Beck Depression Inventory (BDI; Beck et al., 1998) or the Center for Epidemiologic Studies Depression scale (CES-D; Radloff, 1977). Such approaches focus only on variability in the total number of symptoms and not on specific patterns of symptoms.

An alternative approach is through the classification of participants into distinct subgroups, based on differing combinations of depressive symptom endorsement. Chen and colleagues (2000) applied latent class analysis (LCA) to identify a five-class model of depressive symptoms in a general household sample with participant age ranging from 27 to 96 (mean 48) years. Carragher and colleagues (Carragher et al., 2009) also suggested that identification of latent classes using current depressive symptoms described by Diagnostic and Statistical Manual of Mental Health Disorders Criteria, Fourth Edition (DSM-IV; American Psychiatric Association, 1994) may improve clinical practice. However, their sample covered the full adult lifespan (with potentially greater heterogeneity on associated variables such as age-related stressors, social resources and other factors influencing depressive symptom profiles). Latent classes derived specifically from samples of older adults may be better able to characterize depressive symptom patterns in late life.

Hybels and colleagues (2009) conducted a recent study using a classification procedure to identify subgroups among adult patients aged 60 and above who met DSM-IV criteria for current major depression. Bogner and colleagues (2009) also applied LCA to identify subtypes of depression after interviewing a sample of older adult patients recruited from primary care settings. In addition to depressive symptoms, their analysis included cognitive status and *APOE* genotype as inputs to the derivation of the latent classes. Noting that these studies were conducted in clinic-based samples of older adults, it is unknown whether there are important qualitative differences between clinic vs. population-based samples in terms of possible depression subgroups, severity, willingness to seek medical care, etc. Accordingly, we sought to determine the existence of depression subgroups that differ qualitatively by symptom patterns in a population-based sample of older adults who endorsed one or more current depressive symptoms.

It is well established that depression is associated with mortality and general health (Schulz et al., 2000, Murrell et al., 1983, Stewart et al., 2001). However, little is known about

whether these factors are also associated with specific symptom pattern. Accordingly, we also report analyses exploring the association between the following variables and symptom profiles: socio-demographic background (age, education, female gender, marital status, and recently bereavement), the number of self-reported health conditions (vascular health problems, number of problems with instrumental activities of daily living, having more than one depression episode in the past), current use of antidepressants, and duration of current depression episode.

Methods

Participants

The Cache County Study on Memory Health and Aging (CCS) is a population-based epidemiological study of dementia (Breitner, et al., 1999). In 1995 we invited all 5,756 elderly permanent residents (aged 65 years or older) of the county to participate, and 5,092 (90%) agreed to a baseline interview. We excluded 359 with prevalent dementia and another 188 who had incomplete screening for whom dementia status could not be determined. We also excluded another 21 whose depression information was via proxy interview. Another 1,773 participants had only experienced depressive symptoms in the past, and these were also excluded given their depression reports were retrospective and our focus was on self-reported current depressive symptoms. This left a group of 2,351 who had never experienced a depressive episode and 400 who endorsed one or more current depressive symptoms via self-report at their baseline interview (56.3%) or, for the first time, at their three-year (27.5%) or seven-year follow-up interviews (16.3%). All study procedures were approved by the Institutional Review Boards of Utah State University, Duke University, and The Johns Hopkins University. Informed consent was obtained from study participants at each stage of the study.

Measures

All participants were asked whether their lifetime history included at least two weeks of any of the following: 1) depressed, sad or blue mood; 2) loss of interest or pleasure; or 3) irritability (a common depressive symptom in the elderly). Participants who endorsed at least one of these “gateway” symptoms were asked if they were still experiencing such an episode and if so were given a modified version of the Diagnostic Interview Schedule section on depression (Robins et al., 1981). “Current” symptom questions referred to recent experience (“do you have..” or “have you recently had...”) and included questions about sadness, loss of interest, appetite change, weight change, sleep problems, feeling restless/fidgety or slowed down, fatigue/loss of energy, concentration problems, guilt/worthlessness, and suicidal ideation. Because change in appetite and weight were significantly correlated ($r = .361, p < .0001$), these two symptoms were combined (counted positive if either appetite change or weight change were endorsed) to create a more reliable variable by reducing random error and estimated parameter variance (Chen et al., 2000, Carragher et al., 2009). Thus, we used these nine current depressive symptoms in the latent class analysis, with depressed mood a likely, though not a required, symptom.

A board-certified geriatric psychiatrist (DCS) reviewed the interviews (Steffens et al., 2000) to ensure protocol compliance. This interview was repeated at the three-year and seven-year follow-ups. The present analyses considered the first of these interviews in which the subject reported being in a current depressive episode. Finally, to reduce the possibility that a given depressive episode was part of a dementia prodrome, we only considered depressive episodes if depression onset was at least one year prior to estimated age of dementia onset (for incident dementia cases).

Covariates

In addition to gender and participant age (in years) at the baseline interview, we also noted whether participants were recently bereaved. The following were additional health-related covariates. Number of vascular health problems was computed as number endorsed out of the following list: cerebrovascular accident, myocardial infarction, coronary bypass graft, hypercholesterolemia, hypertension, and type II diabetes. Functional disability was computed as number of problems with instrumental activities of daily living endorsed from the following list: traveling beyond walking distance, meal preparation, laundry, light housework, heavier chores, using telephone, shopping, grocery shopping, shopping for other things, taking medications, and managing finances. First depression episode was coded as either “early onset” (if age < 60 years) or “late onset” (if age $\geq$ 60 years). Current antidepressant use and whether subject had ever had more than one depressive episode, were each coded yes/no. Duration of current episode was coded: less than 6 months, between 6–12 months, and more than 12 months.

Statistical Analyses

The nine depressive symptoms in the current depressive episode were subjected to latent class analysis (LCA) using the computer program *Mplus*, version 6.1. LCA is a statistical technique that identifies subgroups that characterize the heterogeneity of the population, operating under the assumption of conditional independence. The latter term means that, after conditioning on latent class membership, depressive symptoms are assumed to be uncorrelated. LCA uses maximum likelihood techniques to generate estimates of two types of parameters: probability of an individual being in a class (latent class probabilities), and probability of response, given class membership (conditional probabilities) (Vermunt and Magidson, 2002, Lanza et al., 2003).

The decision regarding how many classes to fit was made based on Bayesian information criterion (BIC), Entropy, and Bootstrapped Likelihood Ratio Tests (BLRT) (Nylund et al., 2007). The BLRT value tests for incremental model fit, comparing a solution with k classes to a model with $k-1$ classes (Nylund et al., 2007, Vermunt and Magidson, 2002). Lower BICs indicate better fit, but promote parsimony by penalizing models with large numbers of parameters. Higher Entropy value indicates greater precision of classification (Magidson and Vermunt, 2002).

Multinomial logistic regression using pseudo-class draws was generated simultaneously with LCA in *Mplus* by using posterior probability-based of class membership with multiple imputations (Clark and Muthén, 2009), to evaluate the relationship between latent classes of depressive symptoms and covariates. In addition, a chi-square test of independence was conducted between subgroup based on assigned class membership from the LCA (latent class 1, 2, or 3) vs. dichotomized DSM-IV depression group based on symptom endorsements i.e. those meeting major depression criteria vs. all others with 1–4 symptoms).

Results

In our final sample of 400 participants reporting current depressive episode symptoms, 95.8% were Caucasian and 67.3% were female. Ages ranged from 65 to 99 ($M = 76.4$; $SD = 6.68$), and years of education averaged 12.75 ($SD = 2.54$). The proportion currently married was 48.8%. Each demographic variable was measured as of the current depressive episode used in analyses: baseline or first or second follow-up interview. To address possible survivor bias from inclusion of currently depressed participants from later waves with those from baseline, we compared these three groups across a number of demographic variables. Participants did not differ in education, gender, marital status but did differ on age when

depressed ($F=18.66$, $p < .000$). The mean age when depressed was 79.44 for wave 3, 78.00 for wave 2, and 74.72 for wave 1 participants. In terms of possible biases in depressive symptom profile, there were non-significant differences between the three waves' subsamples on number of depressive symptoms endorsed ($F = .429$, $p = .652$) and on assigned latent class membership (chi-square = 5.76, $df = 4$, $p = .217$). Thus, inclusion of the additional participants whose current depressive episode was from a later wave not only increased statistical power (raising sample size from 255 to 400) but did so without introducing any significant bias by including these additional participants, other than their having aged between waves.

We compared the fit of latent class models with 2, 3, and 4 classes (see Table 1). The two class model had the smallest BIC, while the BLRT test showed significant improvement in fit for two-class and three-class models, but not for the four-class model. In addition, the entropy statistic favored the three-class model. Because of the latter, and because the BLRT has been shown to outperform the BIC in simulation studies, (Nylund et al., 2007) we chose the 3-class model.

The estimated probability and standard error of endorsing depressive symptoms in each class are presented in Table 2. Probably because of the skip pattern in the depression interview, a high proportion of participants endorsed the sadness item (86%), even though this symptom was not required for inclusion (see Table 2 and Figure 1). 86 (21.5%) were classified into class one, with 68.6% female and a mean age of 76.90 ($SD = 6.32$). This class was also characterized by its low conditional probability of endorsement of depressive symptoms with the exception of moderate endorsements in appetite/weight changes (0.53) and fatigue/loss of energy (0.53) in addition to the gateway question of sadness (0.86). The class average number of symptoms was 3.26 ($SD = 1.10$), akin to "minor depression."

Class two included 61.5% of the sample ($n = 246$, 67.5% female) with a mean age of 76.36 ($SD = 6.88$). The symptom profile of this group was characterized by its high endorsement of the majority of symptoms. Estimated probabilities of the various depressive symptoms for participants in this group were: sadness (0.84), loss of pleasure (0.84), change in appetite/weight (0.80), sleep difficulties (0.72), restless/slowed down (0.90), fatigue/loss of energy (0.94), concentration difficulties (0.64), guilt/worthlessness (0.72), and suicidality (0.56). The average number of symptoms was 7.01 ($SD = 1.19$), and the category was more broadly akin to a diagnosis of "major depression" based on DSM-IV.

Class three included 68 persons (17% of the sample), of whom 64.7% were female and the mean age was 76.15 ($SD = 6.88$) years. This class was marked by moderate endorsement of depressive symptoms, with a higher propensity for endorsing sadness (0.96), weight/appetite change (0.61), sleep problems (0.91), feeling restless or slowed down (0.98) and fatigue/loss of energy (0.80). Average number of symptoms was 5.22 ($SD = 0.93$), suggesting a characteristic pattern of either a diagnosis of "minor depression" or "major depression" based on DSM-IV. However, participants in this group not only had significantly fewer total symptoms endorsed than group 2 ($p < .001$), they showed particularly high probability of endorsement of symptoms in the psychomotor domain, rather than high endorsement across symptoms.

To determine the extent of redundancy between this LCA schema and depression groups based on DSM-IV criteria in terms of number of symptom endorsements, we constructed a cross-tabulation between these two approaches (Table 3). Of the participants with at least five depressive symptoms, 78.2% were classified in the comparable latent class with high probability across all symptoms (class 2). Of the remainder with five or more symptoms, 79.4% were classified in the group with primarily psychomotor symptoms (class 3). By

contrast, among participants not meeting DSM-IV criteria for major depression (i.e. they had fewer than 5 symptoms), 76.3% were classified into the latent class with low probability of endorsement across all symptoms (class 1), while 14.4 % were classified in class 3. About 79.4% participants in class 3 had endorsed at least 5 symptoms and may qualify for a major depression diagnosis. A chi-square test confirmed the non-independence of the two schemes (chi-square = 236.06, $df = 2$, $p < .001$), but the results nonetheless suggest their nontrivial discordance.

We performed multinomial logistic regression tests to compare each pair of classes (based on pseudo-class draws from posterior probability-based class membership) in terms of differences in each demographic characteristic or health condition in *Mplus* (Table 4). Omnibus chi-square tests for overall comparison of the three latent classes was significant only for recent bereavement ($p = .005$), number of IADL problems ($p < .001$), and current antidepressant use ($p < .001$). Age ($p = .945$), female gender ($p = .979$), education ($p = .997$), marital status ($p = .470$), early vs. late depression onset age ($p = .297$), having had multiple episodes ($p = .153$), current episode duration (p range .497–.823), and vascular health conditions ($p = .069$) were not significant predictors of latent class membership. Participants in class 1 were significantly more likely to be recently bereaved (OR=2.24; $p = .005$), have significantly fewer IADL problems (OR=.68; $p = .007$), were significantly less likely to be an antidepressant user (OR=.42; $p = .004$) or to have had multiple depressive episodes (OR=.52; $p = .036$), and were somewhat more likely to have had early-onset depression (OR=1.96; $p = .096$) compared with participants in class 2. Participants in class 3 exhibited a number of symptoms midway between the other two classes and with no significant differences compared with class 1 except that class 1 was somewhat less likely to have had multiple episodes (OR=.47; $p = .086$) than class 3. Class 3 differed from class 2 in that class 3 participants were significantly less likely to be users of antidepressants (OR=.36; $p = .005$) and had somewhat fewer IADL problems (OR=.79; $p = .067$).

Discussion

We have described a latent class analysis of depressive symptoms among individuals who endorsed one of three “gateway” questions on depression at interview. Results suggested the existence of three subtypes of depressive symptoms. The largest subgroup comprising approximately two-thirds of the sample had a higher probability of endorsement across all symptoms and greater likelihood of being treated with antidepressants, akin to clinical or major depression. The remaining participants were split roughly evenly between a second subgroup with low probability of any symptoms (other than sadness) and a third subgroup with an average number of symptoms that was sufficient to meet DSM-IV criteria for major depression and midrange between those of the other two subgroups.

Although there was some expected overlap between these three latent classes of depressive disorder and diagnoses generated using DSM-IV criteria, there was an important qualitative feature in class 3 with high endorsement of psychomotor changes, sleep symptoms and fatigue, distinguishing this group from the others beyond simple symptom count. It is also noteworthy that the three LCA subgroups of depressive symptoms did not differ meaningfully across socio-demographic variables. However, the third subgroup had lower likelihood of antidepressant use, and fewer IADL problems, than the “major” depression group. They were, however, somewhat more likely to have had multiple episodes, compared with the “subsyndromal depression” subgroup. Overall, the third subgroup has a distinctive symptom profile, with dysthymia, psychomotor changes, and no apathy. We speculate that this syndrome corresponds to a picture that is familiar to clinicians, occurring more often in older than in younger depressives, and possibly related to neurodegenerative illnesses that are prevalent in older age groups.

A number of other studies using latent class analytic approaches have classified depressive symptoms into three-class (Bogner et al., 2009, Eaton et al., 1989), four-class (Carragher et al., 2009), five-class (Chen et al., 2000), or even six-class models (Sullivan et al., 1998) for depression related subgroups (see Table 5 for summary of derived latent classes). Among these, our results are probably most comparable with those from Carragher et al. (2009), with the noteworthy distinction that our approach did not include a non-depressed participant group (hence, we derived a three-class vs. a four-class model). The larger numbers of latent classes found in other studies might have reflected variation in their sample sizes or, different age ranges of the participants, with all but onestudy including participants across other life stages than just late life, and some of these studies examine lifetime experience of depressive symptom endorsements while others examine more recent experiences (See Table 5). Most other studies used symptom items from drawn directly from DSM-based instruments or from the CES-D scale. A noteworthy exception is the study by Bogner (Bogner et al., 2009) which employed a clinical sample, but which included cognitive functioning in addition to depressive symptoms in its derivation of subgroups.

Strengths and Limitations

The current study has a number of strengths. First, it used LCA to identify individual subgroups of depressed persons and to delineate inter-group differences that were based on depressive symptoms alone rather than mixing them with other health condition indices. Then, it (independently) explored the association of depressive symptom profiles with covariates. Finally, the use of a sample drawn from the entire community adds to a literature largely based on studies using clinic-based samples whose participants were self-identified depressed individuals who came seeking treatment.

A few limitations of this study can also be noted. First, the use of self-report data is subject to possible social desirability or acquiescence bias resulting from stigma (although informant reports of depressive symptoms may also underestimate or overestimate the severity of the participants' symptoms.) Second, because of the skip pattern used in the depression interview, not all participants were asked all nine symptom questions. Instead, the sample was restricted to those who endorsed at least one gateway depression question (i.e., sadness and loss of interest). Thus, this sample does not include individuals who might have endorsed a number of the follow-up symptoms (had they been asked) but had not endorsed a gateway question. In particular, our sample may have excluded a number of individuals with the clinical pattern of "depression without sadness" described by Gallo and colleagues (Gallo et al., 1997). Also, given the psychomotor changes of agitation and retardation were combined into a single item, future studies should specify which psychomotor change the participant is reporting.

Conclusion

Our findings support the conclusions of extant literature suggesting the existence of qualitatively distinct subgroups of depressive symptom profiles, beyond simple differences in symptom count or severity. Importantly, consistent with the findings of Eaton and his colleagues (Chen et al., 2000, Eaton et al., 1989), our results obtained from a population-based sample of older adults were found to not be redundant with the DSM-IV classification scheme. This supports the notion that the class characteristics deriving from LCA may offer meaningful complementary information to DSM diagnostic groups as an approach to categorical distinctions among depressive disorders in community-dwelling older adult populations.

More research is needed to understand and replicate the depression symptom profiles identified in the present study. Ideally these studies should focus specifically on late-life, use

large samples, and include full symptom profiles on all participants. These studies, along with more research in the present cohort, may determine the extent to which some subgroups are predictive of cognitive decline or incident dementia, as have other typologies of depression such as symptom counts (Dal Forno et al., 2005, Shim and Yang, 2006) and DSM diagnostic categories (Steffens et al., 2004). Outcomes of medical comorbidities and earlier mortality should also be examined for differential rates by depression type. Finally, it will be important to distinguish the natural history of the three depression subgroups when untreated, as well as their responses to therapeutic interventions.

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Figure 1.

Table 1
Summary of Latent Class Analysis Model Fit Statistics ($N = 400$)

Models	Loglikelihood (LL)	df	# of parameters	BIC ¹	Entropy ²	BLRT ³
1 Class	-2157.681	502	9	4369.285	N/A	N/A
2 Class	-2068.130	492	19	4250.098	.635	179.101 ($p < .001$)
3 Class	-2047.020	482	29	4267.792	.726	42.221 ($p < .001$)
4 Class	-2037.735	472	39	4309.136	.664	18.570 ($p = .450$)

¹ Bayesian Information Criterion: lower values demonstrate better model fit
² Entropy: higher value indicates greater precision of classification
³ Bootstrap Likelihood Ratio Test, tests for incremental model fit, compared with model with one fewer classes

Table 2

Estimated Probability and Standard Errors of Endorsing Depression Symptoms

Depression symptoms	Class 1 ($p = .215$)		Class 2 ($p = .615$)		Class 3 ($p = .170$)	
	Prob	SE	Prob	SE	Prob	SE
sadness	0.864	0.045	0.837	0.027	0.963	0.042
loss of interest	0.437	0.076	0.837	0.066	0.000	0.000*
appetite/weight change	0.531	0.076	0.801	0.029	0.613	0.127
sleep problems	0.328	0.069	0.723	0.033	0.910	0.154
slow down/restless-fidgety	0.314	0.108	0.903	0.026	0.982	0.074
fatigue/loss of energy	0.527	0.047	0.940	0.042	0.800	0.085
concentration problems	0.120	0.057	0.644	0.038	0.420	0.128
guilt/worthless	0.170	0.064	0.721	0.036	0.268	0.097
death/suicidal	0.297	0.071	0.563	0.022	0.288	0.073

* Standard error cannot be computed with an estimated probability = 0 or 1.

Table 3

Cross-tabulation of Latent Class Analysis-Derived Depression Subgroup (based on the class membership each individual is most likely to be assigned) vs. DSM-IV Depression Group

Depression Subgroup	DSM-IV depression group: Total symptoms <5		DSM-IV depression group: Total symptoms ≥ 5 and must including either sadness or loss of interest	
	% W/in Class	% W/in DSMIV	% W/in Class	% W/in DSMIV
Class 1	86.0%	76.3%	14.0%	4.0%
Class 2	3.7%	9.3%	96.3%	78.2%
Class 3	20.6%	14.4%	79.4%	17.8%

Table 4

Pairwise Comparisons of Demographic and Health Characteristics between Three Classes using Pseudo-Class Membership of Depression Symptom Profile

	Class 1 vs. Class 2			Class 3 vs. Class 2			Class 1 vs. Class 3			Overall test	
	OR	S.E.	p	OR	S.E.	p	OR	S.E.	p	χ^2	p
Age	1.01	.02	.527	1.00	.03	.984	1.01	.03	.652	0.11	.945
Female	0.96	.30	.893	1.01	.34	.979	0.95	.41	.904	0.04	.979
Married	0.83	.27	.476	0.63	.32	.156	1.30	.38	.489	1.51	.470
Education	0.99	.06	.913	1.01	.07	.861	0.98	.08	.819	0.01	.997
Bereaved	2.24	.29	.005	1.64	.33	.136	1.36	.42	.461	10.41	.005
Vascular	0.81	.14	.118	0.76	.18	.133	1.06	.20	.781	5.34	.069
IADLS	0.68	.15	.007	0.79	.13	.067	0.85	.18	.366	17.76	.000
EOD vs. LOD	1.96	.40	.096	0.87	.39	.720	2.25	.50	.102	2.43	.297
Antidepressant Use	0.42	.30	.004	0.36	.36	.005	1.17	.42	.708	18.89	.000
> 1 Episodes	0.52	.31	.036	1.12	.37	.765	0.47	.44	.086	3.72	.153
Current episode duration (Ref grp: > 1ys)											
Less than 6 m	1.08	.31	.815	1.62	.37	.194	0.66	.41	.316	1.40	.497
Between 6–12 m	1.00	.47	.991	0.99	.54	.982	1.01	.61	.991	0.39	.823

Note. Vascular = number of vascular health conditions; IADLS = Number of problems with instrumental activities of daily living; EOD= Early onset of depression (age<60); LOD= Late onset of depression (age>=60)

Table 5

Representative studies identifying depression latent classes

Author (Year)	Sample	Instrument	Time Frame	Identified Latent Classes	
Bogner et al. (2009)	A sample of 305 adults patients aged 65+y	CIDI CES_D	Current	1	Non-depressed
				2	Depressive symptoms and average cognitive functioning
				3	Depressive symptoms and impaired cognitive functioning
Carragher et al. (2009)	A subsample of 12,180 respondents aged from 18 to 65+y from NESARC	DSM-IV	Lifetime	1	Severely depressed
				2	Psychosomatic
				3	ognitive-emotional
				4	Non-depressed
Chen et al. (2000)	A sample of 1,920 adults aged 18–96 from ECA study	DSM-III-R	Lifetime	1	Non-depressed
				2	Anhedonia
				3	Suicidal (with dysphoria)
				4	Psychomotor (with dysphoria)
				5	Severely depressed (with dysphoria)
Eaton et al. (1989)	A total sample size of 6,812 in five-community mental health centre	DSM-III	Lifetime	1	Normal
				2	Intermediate Disorder (not necessary with dysphoria)
				3	Severely depressed with dysphoria
Sullivan et al. (1998)	2,836 participants with a mean age from 33–35 from National Comorbidity Study	DSM-III-R	Lifetime	1	Severe typical
				2	Mild typical
				3	Severe atypical
				4	Intermediate
				5	Minimal symptoms