

Reliability and validity of the Attributional Style Questionnaire- Survey in people with multiple sclerosis

Ian I. Kneebone and Sophie J. Dewar

Abstract

Background: The current study aimed to examine the psychometric properties of an attributional style measure that can be administered remotely, to people who have multiple sclerosis (MS).

Methods: A total of 495 participants with MS were recruited. Participants completed the Attributional Style Questionnaire-Survey (ASQ-S) and two comparison measures of cognitive variables *via* postal survey on three occasions, each 12 months apart. Internal reliability, test-retest reliability and congruent validity were considered.

Results: The internal reliability of the ASQ-S was good ($\alpha > 0.7$). The test-retest correlations were significant, but failed to reach the 0.7 set. The congruent validity of the ASQ-S was established relative to the comparisons.

Conclusions: The psychometric properties of the ASQ-S indicate that it shows promise as a tool for researchers investigating depression in people with MS and is likely sound to use clinically in this population.

Keywords: ASQ-S, attributional style, multiple sclerosis, reliability, validity

Introduction

One of the most influential psychological theories of depression is the reformulated theory of learned helplessness [Abramson *et al.* 1978]. This theory proposes that the attributions people make regarding events that have an impact upon them, may make individuals vulnerable to the development of depression. Most particularly, the theory places significance on the causes that people assign to a negative event. If an individual routinely interprets the causes of negative events as affecting a large range of situations in their life (i.e. a cause that has a global impact) and as due to factors that are recurrent or long-lived (i.e. a cause that is stable over time) that individual is considered more likely to become depressed. Attributional style is considered a trait variable and has been demonstrated as consistent for up to 5 decades [Burns and Seligman, 1989]. Multiple sclerosis (MS) is a demyelinating neuropathy of autoimmune system origin that can profoundly affect an individual's day-to-day function. It is commonly a deteriorative condition. The

reformulated learned helplessness theory would appear particularly relevant to people with MS, who likely experience a greater number of negative life events/stressors due to their condition. Indeed the applicability of this theory has been demonstrated in adults with MS, and also in adults with dysthymic disorder, rheumatoid arthritis, and in children with diabetes, asthma, cancer and cystic fibrosis [Carpentier *et al.* 2007; Frank *et al.* 1997; Heimberg *et al.* 1987; Hommel *et al.* 1998; Kneebone and Dunmore, 2004; Kneebone *et al.* 2015; Kuttner *et al.* 1990].

Depression is a serious co-morbidity of MS with a lifetime prevalence rate of over 50% [Sadovnick *et al.* 1996] making it a clinically important focus for research. Given that learned helplessness theory highlights a link between depression and attributional style it would appear that measures of attributional style are key to the examination of depression in MS. However, the disability that may arise with such illness can limit access to samples to study this phenomenon, meaning it

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Correspondence to:
**Ian I. Kneebone, MPsych,
PsychD**
Discipline of Clinical
Psychology, Graduate
School of Health,
University of Technology
Sydney, Level 4, Building
7, Broadway, New South
Wales, 2007, Australia
ian.kneebone@uts.edu.au

**Sophie J. Dewar,
DClinPsych**
Evelina Hospital, Guy's
and St Thomas's NHS
Foundation Trust, London,
UK

would be useful to identify measures for research use that can be administered remotely (i.e. *via* survey methodology). The purpose of the current investigation was to determine the reliability and validity of an attributional style measure specifically designed for survey use, the Attributional Style Questionnaire-Survey (ASQ-S) [Dykema *et al.* 1996], with people with MS. This was considered particularly important, as it has been suggested that the ASQ-S may not be reliable in longitudinal studies [Riso *et al.* 2006].

The current study hypothesized, based on the reliability and validity of the instrument in a nonillness sample [Dykema *et al.* 1996], that these psychometric properties of the measure would be demonstrable in people with MS. Internal reliability has previously been identified for the ASQ-S in this population [Kneebone and Dunmore, 2004] and it was expected that this would be replicated at successive administrations. Further, and in line with the literature indicating that attributional style is an enduring characteristic [Buchanan and Seligman, 1995], it was expected that test-retest reliability for the questionnaire would be demonstrated at intervals of 12 months and 2 years. Having previously established the association between attributional style and depression thereby demonstrating convergent validity of the ASQ-S [Kneebone and Dunmore, 2004], it was anticipated that congruent validity would also be evident when the ASQ-S was considered with respect to a general measure of cognitive vulnerability to psychological disturbance, the Psychological Vulnerability Scale (PVS) [Sinclair and Wallston, 1999], and a measure specific to MS, the Multiple Sclerosis Attitudes Index (MSAI) [Shnek *et al.* 1995]. Identifying a correlation with existing tests designed to measure the same construct, supports the notion that a test is measuring what it purports to measure. As a final consideration, it was proposed that reviewing the amount of missing data on the ASQ-S, as compared with the other measures administered, would contribute to a greater understanding regarding the practical usability of the instrument. High levels of missing data on the ASQ-S could indicate difficulties that may restrict its use in research.

Methods

Ethics

Ethical approval was obtained from the University of Surrey Ethics committee, UK.

Written informed consent was obtained from participants.

Participants

Participants were a self-selecting sample, obtained as part of a larger study of MS and mood [Kneebone and Dunmore, 2004; Kneebone *et al.* 2015] through articles published in *MS Matters*, the magazine of the MS Society of Great Britain. Respondents over the age of 65 were excluded from the current study as findings that the nature of depression may be different in older people [Jorm, 2000], likely also apply to older people with MS [Kneebone *et al.* 2003]. This resulted in a sample of 495. Table 1 summarizes participant characteristics.

Procedure

Questionnaires (see measures below) were administered *via* post in three phases, each 12 months apart. All measures were administered at each stage. A satisfactory response rate was obtained at both follow ups, with 396 (80%) of participants responding at phase II and 386 (77.8%) at phase III.

Measures

ASQ-S. The ASQ-S [Dykema *et al.* 1996] consists of 12 questions. In each question participants are asked to write one principal cause for a hypothetical negative event (e.g. 'you are guilty of breaking the law'; '...you don't help a friend who has a problem'). They then rate this cause from -3 to +3 for how likely it is that this will continue to affect them (stability: +3 indicates 'will always affect you') and how likely it is that it will affect other areas of their life (globality: +3 indicates 'affects all other areas'). Ratings are converted to a 1-7 scale for scoring.

The ASQ-S provides three sets of scores. Firstly a measure of stability of attributional style for negative events ($STAB = \Sigma \text{stability ratings}/12$), secondly a measure of globality of attributional style for negative events ($GLOB = \Sigma \text{globality ratings}/12$), and finally a single composite score for negative attributional style ($COMP = \Sigma \text{stability} + \Sigma \text{globality}/24$).

The scale has a simpler, clearer format than earlier attributional style questionnaires that facilitates its use in survey research. It has previously

Table 1. Summary of participant characteristics.

	<i>n</i>	%
Total number of participants	495	
Sex		
Male	94	19
Female	401	81
Age, years		
Range	22–65	
Mean	45.88	
Self-reported MS diagnosis		
Relapsing-remitting	221	45
Chronic progressive	159	32
% of chronic progressive classed as primary progressive	49	31
Unknown	91	18
Missing data	24	5
FASQ-R scores, disability		
Range	8–60	–
Mean	36.53	–

FASQ-R, Functional Assessment Screening Questionnaire-Revised; MS, multiple sclerosis.

been found to be internally consistent and valid, and it correlates with reported depressive symptoms similarly to other attributional style questionnaires in a college sample [Dykema *et al.* 1996]. Internal reliability has previously been established ($\alpha > 0.7$) within the current MS sample at phase I [Kneebone and Dunmore, 2004].

Psychological Vulnerability Scale

The Psychological Vulnerability Scale (PVS) [Sinclair and Wallston, 1999] is a six-item scale measuring cognitions believed to support harmful reactions to stress. Participants rate statements (e.g. ‘If I don’t achieve my goals, I feel like a failure as a person’; ‘I am frequently aware of feeling inferior to other people’) from 1 to 5 in terms of how well it describes them with 5 indicating ‘describes me very well’. Aggregate scores range from 6–30, with higher scores indicating greater psychological vulnerability.

The PVS was developed in populations with physical illness. Internal consistency is good (α between 0.70–0.86), as is test-retest reliability (range, 0.80–0.83), and concurrent and construct validity has also been established [Sinclair and Wallston, 1999].

MS Attitudes Index

The MS Attitudes Index (MSAI) [Shnek *et al.* 1995] aims to evaluate patients’ perceptions of helplessness in coping with MS, based on five statements (e.g. ‘MS is controlling my life’; ‘No matter what I do or how hard I try I just can’t seem to get relief from my MS symptoms’), rated between 1 (‘strongly disagree’) and 4 (‘strongly agree’). Summing the ratings gives a single ‘helplessness’ score ranging from 5–20 with higher scores indicating greater helplessness.

The MSAI is based on a tool designed to measure helplessness in people with arthritis [Nicassio *et al.* 1985] but has previously been used to examine the role of cognitive factors in depression in MS [Shnek *et al.* 1997, 1995]. In the current sample, internal reliability of the MSAI was found to be satisfactory ($\alpha = 0.75$).

Center for Epidemiologic Studies Depression scale

The Center for Epidemiologic Studies Depression (CES-D) scale [Radloff, 1977] records self-reported experiences of symptoms of depression for the previous week. Patients rate 20 symptoms (e.g. ‘I thought my life had been a failure’; ‘I felt tearful’ in terms of how frequently they have experienced them on a scale of 0–3 (with 3 indicating greater frequency). Individual scores are summed to give a single ‘depression’ score from 0–60 with higher scores indicating greater frequency of depressive symptoms.

The CES-D scale was developed for use in nonpsychiatric populations. It has previously been used with people who have MS and has been shown to be relatively unaffected by illness variables [Devins *et al.* 1988; Shnek *et al.* 1995]. Internal consistency of the CES-D scale is good (range, 0.63–0.92) [Devins *et al.* 1988; Kneebone *et al.* 2003] and test-retest reliability has been reported as moderate but acceptable (0.61) [Devins *et al.* 1988].

Functional Assessment Screening Questionnaire-Revised

The current study used the shortened 15-item version of the Functional Assessment Screening Questionnaire (FASQ), [Millard, 1989] the FASQ-Revised (FASQ-R) to assess the level of disability in the sample. The measure assesses functional competency or difficulties in five

domains: personal care (e.g. 'cutting your toenails'), occupational (e.g. 'concentrating for 15 min'), leisure (e.g. 'playing your favourite sport'), transport (e.g. 'driving') and instrumental (e.g. 'grocery shopping').

Previous work has established split-half and alternate-form (spouse rating) reliability (0.84 and 0.71 respectively) for the FASQ-R. Further, there is a moderate level of agreement between the FASQ-R and other disability measures [Millard and Jones, 1991]. Of the several measures Millard and Jones studied, the FASQ-R was considered to be affected by negative mood the least.

Data analysis

Internal reliability. The internal reliability of the ASQ-S was investigated by calculating Cronbach's Alpha for the stability and globality scales at phases II and III. An alpha value of 0.7 or above is considered to be acceptable [Field, 2005].

Test-retest reliability

Test-retest reliability of the ASQ-S was investigated by correlating the scores obtained at phase I with those obtained at phases II and III, and the scores obtained at phase II with those obtained at phase III. This analysis was repeated as a first-order correlation with the influence of mood state bias controlled for by partialling out participants' depression score as measured by the CES-D scale.

There is no agreed guideline as to what is considered acceptable in terms of test-retest reliability coefficients, with the literature presenting significant coefficients ranging from 0.4 to above 0.8 [Campbell *et al.* 1999; Hersen, 2004; McDaniel, 1997]. The current study classified 0.7 or above as acceptable in consideration of previous recommendations [Kline, 2000; Streiner and Norman, 1995].

Validity

Congruent validity of the ASQ-S was investigated individually for the composite, stability and globality scales by looking at their correlation with the MSAI and the PVS, completed at the same phase. Validity coefficients between 0.3–0.4 are considered high therefore indicating 'good' validity [Kaplan and Saccuzzo, 2001]. Taking this into

consideration, the current study additionally considered significant coefficients between 0.2–0.3 to indicate 'acceptable' validity.

Missing data

The average number of missing questions on all the measures that were partly completed (incomplete questionnaires) was considered. Nonparametric statistics (Wilcoxon) were used to determine if the average percent of missing questions on the ASQ-S was significantly higher than on other measures.

Results

Internal reliability

Both the stability and globality scales achieved alpha levels >0.7 at phase II (STAB = 0.80; GLOB = 0.82) and phase III (STAB = 0.77; GLOB = 0.79) indicating the scales have acceptable internal consistency (range, 0.77–0.82).

Test-retest reliability

As can be seen in Table 2, although all correlations were highly significant, the coefficients did not reach the required 0.7 set as acceptable for the stability, globality or composite scales for any of the comparisons (range, 0.54–0.60), indicating test-retest reliability of the ASQ-S to be below the acceptability criteria set. When the analysis was repeated with the potential influence of depression controlled, all of the correlation coefficients were marginally decreased (range, 0.46–0.58), but remained highly significant, indicating that depression was not a substantial influence on the observed results.

Validity

The results of the validity testing are presented in Table 3. There was good congruent validity demonstrated for the stability, globality and composite scores of the ASQ-S when compared with the PVS. All correlations were significant with coefficients exceeding the 0.3 taken to indicate 'good' validity, at all phases (range, 0.33–0.41). Congruent validity was also demonstrated for the stability, globality and composite scores of the ASQ-S when compared with the MSAI. At all phases all correlations were significant with coefficients indicating either 'acceptable' (0.2–0.3) or 'good' (>0.3) validity (range, 0.26–0.35).

Table 2. Correlation coefficients of the stability, globality and overall scores as compared with each other at each phase (test-retest reliability).

	Phase I versus phase II	Phase I versus phase III	Phase II versus phase III
STAB ^a	0.55	0.60	0.60
STAB ^b	0.52	0.57	0.58
GLOB ^a	0.54	0.56	0.55
GLOB ^b	0.46	0.50	0.51
COMP	0.59	0.64	0.60

CES-D, Center for Epidemiologic Studies Depression scale; COMP, overall; GLOB, globality; STAB, stability.
 **= $p < 0.001$.
^aZero-order Pearson's correlation coefficient.
^bPartial correlation coefficient with effect of depression score at both phases controlled for: depression measured using the CES-D.

Table 3. Correlation coefficients of stability, globality and overall scores of the ASQ-S compared with the MSAI and the PVS at each phase (concurrent validity).

Phase		MSAI			PVS		
		1	2	3	1	2	3
STAB	<i>r</i>	0.32**	0.35**	0.29*	0.33**	0.37**	0.35**
	<i>n</i>	314	223	221	317	224	221
GLOB	<i>r</i>	0.26*	0.30**	0.24*	0.41**	0.38**	0.39**
	<i>n</i>	312	222	217	315	223	217
COMP	<i>r</i>	0.30**	0.34**	0.29*	0.40**	0.40**	0.40**
	<i>n</i>	262	220	215	264	221	215

ASQ-S, Attributional Style Questionnaire-Survey; COMP, overall; GLOB, globality; MSAI, Multiple Sclerosis Attitudes Index; PVS, Psychological Vulnerability Scale; STAB, stability.
 All correlations were significant at $p < 0.001$ level. *acceptable validity; **good validity.

Missing data

At all three phases there was a significantly higher percentage of missing questions on the ASQ-S as compared with both the PVS (Wilcoxon, $n = 495$: P1, $z = -11.9$; $p > 0.00$; P2, $z = -10.9$; $p > 0.00$; P3, $z = -10.2$; $p > 0.00$) and the MSAI (Wilcoxon, $n = 495$: P1, $z = -11.6$; $p > 0.00$; P2, $z = -10.5$; $p > 0.00$; P3, $z = -10.2$; $p > 0.00$). At none of the phases was there a significant difference in the percentage of missing questions on the PVS as compared with the MSAI (see Table 4).

Discussion

Internal reliability of the ASQ-S was good at second and third administrations for both the globality and stability scales. Although scores were highly correlated, the test-retest reliability of the ASQ-S did not meet the 0.7 criteria set for acceptability. The congruent validity of the stability, globality and composite scales of the ASQ-S was

established as compared with both the PVS and the MSAI. There was a significantly greater amount of missing data on the ASQ-S as compared with the PVS and the MSAI at all administrations.

Reliability

Consistent with previous findings [e.g. Dykema *et al.* 1996; Kneebone and Dunmore, 2004] internal reliability of the ASQ-S at phases II and III was identified. The ASQ-S is highly internally consistent. Although not the first study to fail to find long-term test-retest reliability of the ASQ-S [Riso *et al.* 2006], this finding is surprising given the literature indicating that attributional style is a highly stable construct [Buchanan and Seligman, 1995].

There are two potential explanations for a failure to find test-retest reliability of the ASQ-S within the current sample. Firstly, illness events may

Table 4. Average percentage of missing questions on the ASQ-S, the PVS, and the MSAI at each phase.

	Phase I	Phase II	Phase III
ASQ-S	15%	31%	35%
PVS	2%	20%	23%
MSAI	2%	21%	23%

ASQ-S, Attributional Style Questionnaire-Survey; MSAI, Multiple Sclerosis Attitudes Index; PVS, Psychological Vulnerability Scale.

alter attributional style in people with MS. Research with delusional and schizophrenic populations has found inconsistency in attributional style with fluctuations corresponding with delusional and psychotic episodes [Krstev *et al.* 1999; Peters and Garety, 2006]. It would be worth investigating whether apparent inconsistency in attributional style, as measured by the ASQ-S in participants with MS, might likewise correspond with fluctuations in the course of their illness.

A second possible explanation is that treatment factors may alter attributional style in people with MS. It is known that some participants in the current sample received treatment for depression over the course of the study [Sollom and Kneebone, 2007]. Given that psychological therapies, particularly cognitive behavioural therapy (CBT), can impact on negative attributional style [DeRubeis and Hollon, 1995; Jarrett *et al.* 2007; Peterson *et al.* 2004; Wain *et al.* 2011], exposure to such interventions may account for the reduced consistency found in this chronic illness sample.

The level for acceptability of test-retest reliability required in the current investigation was high compared with some studies of other instruments [Campbell *et al.* 1999; McDaniel, 1997]. Perhaps a less stringent acceptability value would have been more appropriate given the long length of time between questionnaire administrations. Campbell and colleagues use a reliability classification of strong (>0.80), moderate ($0.50-0.79$) and weak (<0.50) [Campbell *et al.* 1999]. When the current results are reinterpreted according to this classification there is weak-to-moderate, but acceptable test-retest reliability for all scales of the ASQ-S. In support of test-retest reliability, the current reliability coefficients are comparable with figures obtained for other measures of salient cognitive style over a similar time frame [Riso *et al.* 2006]. However, as a point of comparison, a

meta-analysis of the reliability of the Minnesota Multiphasic Personality Inventory, 2nd edition (MMPI-2) [Butcher *et al.* 1989], widely regarded as the ‘standard of psychological assessment’ [Parker *et al.* 1988], reported an average test-retest correlation coefficient of 0.7 with time intervals up to 2 years [Parker *et al.* 1988]. This may indicate that the level set for acceptability in the current investigation was not unjustifiably high. It is also interesting to note that the current reliability coefficients are considerably higher than those reported by Riso and colleagues [Riso *et al.* 2006].

Validity

The current findings pertaining to the validity of the ASQ-S are positive. It appears that there is good congruent validity both with a general measure of cognitive vulnerability (PVS) as well as with a measure specific to MS (MSAI), supporting it as a valid measure for use in people who have MS.

Missing data

The current study investigated the amount of missing data from the ASQ-S in relation to the other measures used to determine how user-friendly the questionnaire is. The significantly greater number of missing questions on the ASQ-S as compared with the other measures may suggest that participants are having difficulty completing the measure or answering some of the questions. The ASQ-S has substantially more questions than the PVS or the MSAI meaning that fatigue may play a role in increasing the number of questions missed. If researchers wish to use the ASQ-S with illness populations, they will need to take this into account.

Future directions and conclusions

The ASQ-S shows promise as a tool for use with people who have MS. It has good internal reliability and congruent validity. Although test-retest coefficients did not reach our acceptability levels, they would meet less stringent criterion. Whilst this research highlights a need for an agreed level of test-retest reliability, which takes into account time between administrations, it is also recommended that research considers the stability of attributional style as a construct in people with chronic illnesses such as MS. Looking at fluctuations in illness progression and treatment interventions between administrations in research participants with chronic illness would help

control for illness-related factors that may have affected the test-retest reliability of the ASQ-S in the current study.

It is a limitation of the current study, which could be addressed in future research, that the order in which the questionnaires were completed was not counterbalanced. As such, conclusions regarding the amount of missing data are restricted. As well as counterbalancing, future investigations could consider qualitative interviews with participants to examine user opinions as to how the questionnaire could be made more useable. On the basis of such studies, the questionnaire could perhaps be modified to minimize the likelihood of missing data and further facilitate its use *via* remote administration. The current investigation suggests the ASQ-S is sufficiently psychometrically sound for clinical application. It might be used to identify dysfunctional attributional style that contributes to depression in people with MS. It follows it could inform/direct treatment; indeed it has already been used in an intervention study, albeit only in a case series design [Wain *et al.* 2011].

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