Royal College of Surgeons in Ireland

repository@rcsi.com

Psychotic symptoms, functioning and coping in adolescents with mental illness.

AUTHOR(S)

Johanna TW Wigman, Nina Devlin, Ian Kelleher, Aileen Murtagh, Michelle Harley, Anne Kehoe, Carol Fitzpatrick, Mary Cannon

CITATION

Wigman, Johanna TW; Devlin, Nina; Kelleher, Ian; Murtagh, Aileen; Harley, Michelle; Kehoe, Anne; et al. (2014): Psychotic symptoms, functioning and coping in adolescents with mental illness.. Royal College of Surgeons in Ireland. Journal contribution. https://hdl.handle.net/10779/rcsi.10795256.v2

HANDLE

10779/rcsi.10795256.v2

LICENCE

CC BY-NC-ND 4.0

This work is made available under the above open licence by RCSI and has been printed from https://repository.rcsi.com. For more information please contact repository@rcsi.com

URL

https://repository.rcsi.com/articles/journal_contribution/Psychotic_symptoms_functioning_and_coping_in_adolescents_with_mental_illness_/10795256/2

BMC Psychiatry

RESEARCH ARTICLE Open Access

Psychotic symptoms, functioning and coping in adolescents with mental illness

Johanna TW Wigman[1,2*], Nina Devlin[1], Ian Kelleher[1], Aileen Murtagh[1], Michelle Harley[1,3], Anne Kehoe[4], Carol Fitzpatrick[5] and Mary Cannon[1,6]

Abstract

Background: Psychotic symptoms in the context of psychiatric disorders are associated with poor functional outcomes. Environmental stressors are important in the development of psychosis; however, distress may only be pathogenic when it exceeds an individual's ability to cope with it. Therefore, one interesting factor regarding poor functional outcomes in patients with psychotic symptoms may be poor coping. This paper aimed to address the question whether 1) psychotic symptoms are associated with poorer functioning and 2) whether poor coping moderated the association.

Methods: In a clinical case-clinical control study of 106 newly-referred adolescent patients with non-psychotic psychiatric disorders, coping was investigated using the Adolescents Coping Scale. Severity of impairment in socio-occupational functioning was assessed with the Children's Global Assessment Scale.

Results: Patients with non-psychotic psychiatric disorders and additional psychotic symptoms (N = 50) had poorer functioning and were more likely to use avoidance-oriented coping compared to patients with non-psychotic psychiatric disorders without psychotic symptoms (N = 56). No differences were found with respect to approach-oriented coping. When stratifying for poor/good coping, only those adolescent patients with psychotic symptoms who applied poor coping (i.e. *less* use of approach-oriented coping styles [OR 0.24, $p < 0.015$] and *more* use of avoidance-oriented coping [OR 0.23, $p < 0.034$]) had poorer functioning. However, these interactions were not significant.

Conclusions: Non-adaptive coping and poorer functioning were more often present in adolescents with non-psychotic psychiatric disorders and additional psychotic symptoms. Due to small subgroups, our analyses could not give definitive conclusions about the question whether coping moderated the association between psychotic symptoms and functioning. Improvement of coping skills may form an important target for intervention that may contribute to better clinical and functional outcomes in patients with psychotic symptoms.

Keywords: Psychotic symptoms, Coping, Adolescents, Functioning, Mental health

Background

Environmental stressors are an important factor in the development of psychopathology [1,2]. Stress, however, has a subjective nature, which is reflected in the fact that an event becomes stressful only when it overwhelms an individual's ability to cope with it [3]. Coping refers to the process of managing the internal and external demands created by stressful events that are considered taxing or that exceed the individual's resources [4,5]. A large body of evidence suggests that coping impacts on both physical and mental health [5]. Coping can be described as existing along two dimensions, based on the approach or avoidance of the stressor [5]. Examples of approach-oriented coping are active problem solving, or seeking social or professional support. Examples of avoidance-oriented coping include denying or ignoring the stressor, or displaying emotional responses to the stressor such as worrying or ruminating, or engaging in wishful thinking or self-blame. In general, approach-oriented coping is seen as adaptive coping, whereas

* Correspondence: hanneke.wigman@maastrichtuniversity.nl
[1]Department of Psychiatry, Royal College of Surgeons in Ireland, Education and Research Centre Dublin, Dublin, Ireland
[2]Department of Psychiatry and Neuropsychology, School of Mental Health and Neuroscience, Maastricht University Medical Centre Maastricht, Vijverdalseweg 1, 6226 NB Maastricht, the Netherlands
Full list of author information is available at the end of the article

BioMed Central

© 2014 Wigman et al.; licensee BioMed Central Ltd. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/2.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited.

avoidance-oriented coping is usually considered as non-adaptive coping [5].

Poor coping is a well-established feature in the development of many psychiatric disorders [1,2], including the expression and development of psychosis [6-8]. Studies have for example shown that non-adaptive coping is applied more often by individuals with chronic schizophrenia as well as by individuals who experience a first psychotic episode or relapse (see for review [6]). More adaptive coping has been associated with better course and outcome; conversely, less adaptive coping has been associated with poorer course and outcome in psychosis [5,8]. Likewise, more non-adaptive coping has consistently been associated with poorer course and outcome in terms of symptom remission and general functioning [5,6]. Thus, poor coping encompasses both a high use of non-adaptive coping as well as a low use of adaptive coping. Good coping, conversely, encompasses a high use of adaptive coping and a low use of non-adaptive coping.

Recent research has shown that psychotic symptoms are prevalent in the population and commonly occur outside the range of a psychotic disorder [9]. Meta-analyses of community studies have demonstrated a median prevalence of psychotic symptoms of 5% in adults [9] and higher prevalences in children and adolescents, with a median population prevalence of 17% in 9-12 year olds and 7.5% in 13-18 year olds [10]. Furthermore, these psychotic symptoms have been suggested to be a marker of psychopathological severity in people with psychiatric disorders [11]. In both community and clinical samples of young people with non-psychotic psychiatric disorders, the presence of psychotic symptoms has been shown to be a strong marker of risk for multimorbidity (i.e. the presence of multiple co-occurring disorders) [11] and suicidal behavior [12]. In terms of etiological loading, it has furthermore been shown that a range of risk factors for psychotic disorder (including substance use, trauma and urbanicity) are more common in individuals with depressive or anxiety disorders who also report psychotic symptoms, compared to individuals with depressive or anxiety disorders who do not report psychotic symptoms [13]. With regard to treatment and treatment response, patients with major depressive disorder (MDD) who report clinical [14] or subclinical [15] psychotic symptoms have been shown to have poorer treatment outcomes than patients with MDD without psychotic symptoms.

The exact mechanisms leading to these poorer (clinical and functional) outcomes, however, remain unclear. One factor that may contribute to poor functional outcome in patients with psychotic symptoms is poor coping. For one, poor coping has been proposed to serve as a direct and strong connection between psychopathology and functioning in psychotic disorder [16]. Recent work in adolescents showed that individuals reporting subclinical psychotic experiences demonstrated more use of poor coping styles [17-20]. In a study of general population adolescents, Lin and colleagues [20] showed that the use of adaptive coping styles was associated with a decrease in psychotic experiences over time, whereas the use of non-adaptive copings styles was associated with persistence of such experiences over time. In addition to poorer coping, individuals with persisting psychotic experiences reported lower levels of functioning over time. To our knowledge, however, there has been no research to date on the association between psychotic symptoms and coping in clinical populations with (non-psychotic) psychiatric disorders, i.e. in relation to psychotic expression in the context of other psychopathology. The aim of this paper was to investigate whether poor coping might be a partial explanation for poor functional outcomes in patients with psychotic symptoms. We therefore addressed the following questions:

(i) In a clinical sample of adolescents with non-psychotic psychiatric disorders, do adolescents with additional psychotic symptoms differ in their coping styles from adolescents without additional psychotic symptoms? Specifically, do patients who report psychotic symptoms demonstrate poorer coping skills than patients who do not report psychotic symptoms?
(ii) Does coping moderate the association between psychotic symptoms and functioning?

Methods

Study population

The study was carried out in a large child and adolescent mental health outpatient service (CAMHS) in Ireland, which provides services to young people under 16 years living in its catchment area. The catchment area of the service has a population of approximately 380,000, of whom approximately 73,000 are under the age of sixteen years. It is divided into five sectors, each served by a multi-disciplinary team. Subjects of the study comprised all new adolescent referrals to two of these multi-disciplinary teams during the study period of 2008-2009. The area served by these two teams includes pockets of severe inner city deprivation, large suburban housing estates and more affluent areas of private housing. The study was approved by the Mater Misericordiae University Hospital's Research Ethics Committee. Informed consent was obtained from the parents of the participants, as these were underage.

Instruments

Psychotic symptoms

The interview instrument used to assess psychopathology was the Schedule for Affective Disorders and

Schizophrenia for School-aged Children, Present and Lifetime versions (K-SADS-PL) [21], a well-validated semi-structured research diagnostic interview for the assessment of Axis-1 psychiatric disorders in children and adolescents. The exposure measure was the presence or absence of hallucinations and delusions. The methods used by the K-SADS to assess psychotic symptoms in children are described in detail elsewhere [22]. Briefly, auditory hallucinations and non-auditory hallucinations, including hallucinatory experiences affecting the other senses, including visual, tactile or somatic, and olfactory hallucinations were classified as psychotic symptoms. A range of delusional thoughts, including delusions of reference, control or influence, persecution, grandiosity and nihilism, were also classified as psychotic symptoms. The interviewers recorded notes of any potential psychotic phenomena during the interview. A clinical consensus meeting was held following the interviews (with IK, AM and MC) to classify these phenomena as psychotic symptoms (or not), blind to diagnoses and all other information on the participants.

Functioning

Severity of impairment in socio-occupational functioning was assessed with the Children's Global Assessment Scale (CGAS), which is based on the Global Assessment Scale for Adults [23]. The CGAS is divided into ten levels, with the lowest (scored between 1 and 10) indicating very severe impairment ('needs 24-hour care/supervision') and the highest (scored 91 to 100) indicating a very healthy level of functioning ('superior functioning in all areas'). CGAS scores were not normally distributed. To deal with this non-normality and to enable within-group comparisons, the CGAS score was dichotomized around the median, creating a variable indicating poorer (0) or better (1) functioning relative to the average participating patient.

Coping

The Adolescent Coping Scale (ACS) [24] was used to assess the coping styles that the adolescents apply. Adolescents are asked to report how frequently they use any of the 18 different coping styles described in the questionnaire on a five-point scale, ranging from 'not at all' (0) to 'a great deal' (4).

Analyses

First, the factor structure of the ACS was investigated, because its factor structure has not been examined in clinical samples so far. This was done using parallel analysis [25], a technique that helps to determine the optimal number of factors to retain in Principal Component and Exploratory Factor Analysis. It is based on Monte Carlo simulation and is considered superior to other commonly used techniques. In parallel analysis, eigenvalues based on random data sets as well as eigenvalues based on the actual data are extracted. These random data sets are permutations of the raw data set and parallel it in number of cases and variables. Factors are retained as long as the *i*th eigenvalue extracted from the actual data is greater than the *i*th eigenvalue extracted from the random data. Next, a PCA was performed with the number of factors to extract based on the results of parallel analyses, allowing for VARIMAX rotation (i.e. orthogonal rotation, assuming uncorrelated factors).

Next, the following analyses were run to answer the research questions:

(i) In a clinical sample, do adolescents with psychotic symptoms differ in their coping from adolescents without psychotic symptoms?
In order to answer this question, two ANOVA analyses were performed, using presence of psychotic symptoms as the independent variable and (i) approach-oriented coping and (ii) avoidance-oriented coping as dependent variables. To visualize the distribution of the use of poor and good coping skills, we calculated the number of patients with (i) more and less use of approach-oriented coping and (ii) more and less use of avoidance-oriented coping separately for patients with and without psychotic symptoms by splitting around the mean adaptive and non-adaptive coping scores.

(ii) Does coping moderate the association between psychotic symptoms and functioning?
In order to answer this research question, logistic regression was performed, using presence of psychotic symptoms as independent variable and the dichotomized functioning variable as dependent variable and stratified for good and poor coping. Thus, four logistic regression analyses were run, stratified for poor coping ((i) less use of approach-oriented coping and (ii) more use of avoidance-oriented coping) and for good coping ((i) more use of approach-oriented coping and (ii) less use of avoidance-oriented coping). Stratifying for poor coping was based on the existing literature, and tested by investigating the interaction effect of coping and presence of psychotic symptoms in the model predicting functioning. All analyses were controlled for age and gender.

Results

Sample

The study included adolescents aged 12-16 years who were referred during the study period (2008-2009) and who could be seen in the next four weeks. This, because it was felt not to be in the best interests of adolescents

and their families to expose them to a detailed research assessment, unless a clinical service could be guaranteed within a reasonable period. Of these 162 adolescents eligible for the study, 20 adolescents or their parents refused to participate. Following clinical assessment, 27 of these adolescents did not have a diagnosable psychiatric disorder. Data on the variables of interest (i.e. psychotic symptoms, coping and functioning) were available for 106 of the remaining 115 adolescents. Thus, the final data set used for the analyses consisted of 106 adolescents.

Of these 106 patients, 59 (56%) were boys and mean age was 13.8 years (SD 1.1; range 12-16). Detailed information on psychopathology has been previously reported [26]. Psychotic symptoms were reported by 50 patients (47%). There was no difference in age, gender or type of previous intervention (this last available for N = 72) between the subgroups with and without additional psychotic symptoms (all $p > 0.05$).

Coping

Results from the parallel analyses showed that the first eigenvalue of the actual data set (3.26) was higher than the eigenvalue generated from the random data set (1.81), as was the second (3.00 versus 1.64). However, the third eigenvalue generated by the actual dataset (1.48) was not higher than the one generated by the random data set (1.51) (Figure 1). Therefore, it was concluded that the ACS was best described by a two-factorial underlying structure. The distribution of the items over the two factors derived from subsequent PCA analysis and the factor loadings are shown in Table 1. Based on the content of the items, these factors were labeled "approach-oriented coping" and "avoidance-oriented" coping. Thus, two variables related to coping were constructed: (i) approach-oriented coping (sum score of all items on the 'Approach-oriented coping' factor) and (ii) avoidance-oriented coping (sum score of all items on the 'Avoidance-oriented coping' factor). Since item 5 loaded equally on both factors, this item was excluded from the calculation of the two subscales. These two variables were then split around the mean to indicate respectively less or more use of both approach-oriented and avoidance-oriented coping styles. Internal consistency of the two factors was good (Cronbach's alpha = 0.72 for approach-oriented coping and 0.73 for avoidance-oriented coping). The two factors were not correlated (Spearman $r = -0.06$; $p = 0.524$), demonstrating that they represent dimensions of coping that exist independently.

Table 1 Factor loadings of the two factors of the *Adolescent Coping Scale*

		Approach-oriented coping	Avoidance-oriented coping
1	Seek social support	0.45	
2	Solving the problem	0.51	
3	Work hard to achieve	0.40	
4	Worry		0.63
5	Spend time with boyfriend/girlfriend	0.19	0.19
6	Social action	0.61	
7	Wishful thinking		0.64
8	Not coping		0.70
9	Tension reduction		0.44
10	Seek to belong		0.50
11	Ignore the problem		0.29
12	Self-blame		0.67
13	Keep to self		0.41
14	Seek spiritual support		0.45
15	Focus on the positive	0.71	
16	Seek professional help	0.50	
17	Seek relaxing diversions	0.74	
18	Physical recreation	0.63	
	Mean factor loading	0.57	0.52

NB Item 5 loaded equally on both factors; therefore, this item was excluded from calculating the subscales and the mean factor loadings.

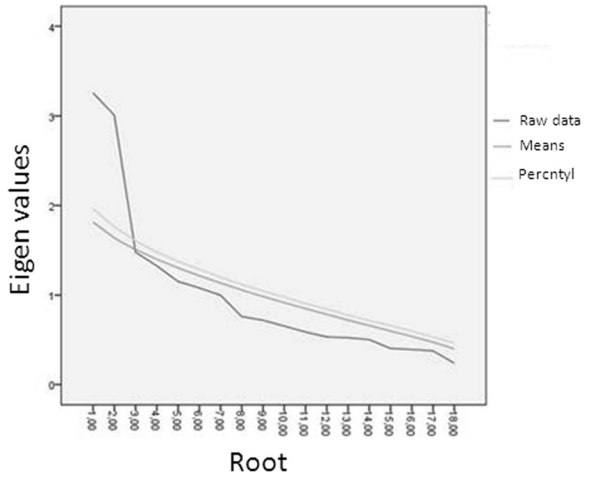


Figure 1 Scree plot of data-obtained eigen values of the ACS compared to randomly generated eigen values.

Coping and psychotic symptoms

There was no difference in use of approach-oriented coping between patients with (mean score 23.6, SD 6.0) and without (mean score 24.1, SD 5.6) psychotic symptoms ($F(1,99) = 0.01$; $p = 0.926$). Patients with psychotic symptoms used more avoidance-oriented coping styles (mean score 27.0, SD 6.1) than patients without psychotic symptoms (21.7, SD 6.5) ($F(1,99) = 15.50$; $p < 0.001$).

Using the dichotomized coping variables, the distribution of less/more use of good and poor coping across patients with and without psychotic symptoms is shown in Table 2.

Functioning and psychotic symptoms

The proportion of patients with lower functioning was significantly higher in the group of patients with additional psychotic symptoms compared to the group of patients without psychotic symptoms ($\chi^2(1) = 9.69$; $p < 0.002$) (Table 3).

Coping as a moderator of the association between psychotic symptoms and functioning

In Table 4, the odds ratios (ORs) of the stratified analyses are depicted that show that patients with psychotic symptoms have lower levels of functioning compared to patients without psychotic symptoms, but that this association is stronger (and significant only) for patients with psychotic symptoms who apply poor coping (i.e. *less* approach-oriented and *more* avoidance-oriented coping) compared to patients who apply good coping (i.e. *more* approach-oriented and *less* avoidance-oriented coping). However, when testing for significance of the moderation effects (i.e. the interaction between presence of psychotic symptoms and poor coping), no significant interactions were found for approach-oriented coping (Z = -0.80, $p = 0.422$) or avoidance-oriented coping (Z = -1.51, $p = 0.132$).

Discussion

The current study showed that, in a clinical sample of adolescents referred to mental health services, the presence of psychotic symptoms in adolescents with non-psychotic psychiatric disorders was associated with both lower levels of functioning and more use of avoidance-oriented coping styles compared to adolescents with psychiatric disorders without psychotic symptoms. Although no significant moderation effects were found, probably due to too small subgroups and thus limited statistical power, the stratified analyses (stratified for good or poor coping) suggested that individuals with psychotic symptoms only had lower levels of functioning if they used poor coping (i.e. *less* use of approach-oriented coping styles and *more* use of avoidance-oriented coping styles). The findings of the current paper suggest that psychotic symptoms, poor coping and poor functioning are associated, but they cannot give definitive conclusions on the question whether poor coping moderates the association between psychotic symptoms and poor functional outcomes.

The Adolescent Coping Scale was found to be best represented by two underlying factors in the current sample, reflecting approach-oriented (adaptive) and avoidance-oriented (non-adaptive) coping. In line with earlier work on coping [2,5], these factors were shown to be independent, though not mutually exclusive, dimensions of coping. This independence was supported by the facts that the two factors were not correlated. Also, both *less* use of approach-oriented coping and *more* use of avoidance-oriented coping were suggestively associated with lower levels of functioning in patients with psychotic symptoms. Literature on coping in mental health research usually focuses mostly on avoidance-oriented or other non-adaptive coping styles. The current study, however, underlines the importance of also including adaptive coping, such as approach-oriented coping, in relation to mental health research, as suggested by Roe and colleagues [8] who stress the importance of resilience in the context of mental health.

As we hypothesized, and consistent with complementary research [5,6,8], patients with psychotic symptoms applied more avoidance-oriented coping than patients without psychotic symptoms. However, no differences were found with regard to approach-oriented coping; this is somewhat surprising since earlier work in the context of psychosis has shown that more adaptive coping is associated with better outcome [8]. Patients with psychiatric disorders and psychotic symptoms did, however, report less use of approach-oriented coping, i.e. the (small) difference was in the expected direction, although non-significant.

Patients with psychiatric disorders and psychotic symptoms were rated with lower levels of functioning compared to patients with psychiatric disorders but without psychotic symptoms. Level of daily functioning is an important outcome in psychopathological research in addition to clinical outcome, especially from the point

Table 2 The distribution of good and poor coping over patients with and without psychotic symptoms

	Avoidance-oriented coping		Approach-oriented coping	
	Patients without psychotic symptoms	Patients with psychotic symptoms	Patients without psychotic symptoms	Patients with psychotic symptoms
Less use	39 (70%)	22 (44%)	27 (54%)	29 (58%)
More use	17 (30%)	28 (56%)	29 (46%)	21 (42%)
Total	*56*	*50*	*56*	*50*
	$\chi^2(1) = 7.11$; $p < 0.008$		$\chi^2(1) = 1.02$; $p < 0.314$	

Table 3 The distribution of lower and higher functioning over patients with and without psychotic symptoms

	Patients without psychotic symptoms	Patients with psychotic symptoms
Lower functioning	20 (36%)	33 (66%)
Higher functioning	36 (64%)	17 (33%)
Total	*56*	*50*
	$\chi^2(1) = 9.69$; $p < 0.002$	

of view of the patient and their social context, clinicians and society [27], and provides important information regarding an individual's situation that is not per definition the same as or dependent on clinical diagnosis [28,29]. Thus, the current study underlines the importance of functioning as an outcome of interest in the context of psychotic symptoms, especially regarding possible avenues for intervention involving, for example, coping.

There are several possible explanations for the finding that adolescents with psychiatric disorders and additional psychotic symptoms report poorer functioning. It has been suggested that psychotic symptoms can be seen as an "index of severity" of psychopathology [11]. Thus, individuals with psychotic symptoms may be more ill: individuals with psychiatric disorders who report psychotic symptoms simply have more symptoms of psychopathology than individuals with psychiatric disorders who do not report psychotic symptoms. To make sure that it is not the more severe psychopathological loading that explains the association between psychotic symptoms and functioning, we ran a post-hoc analysis in which presence of psychotic symptoms predicts functioning, while controlling for number of mental disorders present (as an index of psychopathological severity). After controlling for this, the effect of psychotic symptoms diminished somewhat but remained significant, showing that the effect of psychotic symptoms on functioning can be partly, but not wholly, explained by severity of illness (data not shown). Earlier work has also shown that common mental disorders with and without additional psychotic symptoms differed quantitatively by indicators of severity, course, onset, and environmental and familial risks, indicating that the co-presence of psychotic symptoms in non-psychotic psychiatric disorders is a common and functionally and etiologically highly relevant feature [13]. Another explanation may be that individuals with additional psychotic symptoms represent a subgroup of adolescents in which psychotic symptoms are a relatively late expression of a developmental pathway that has started earlier in life. It has been suggested that whereas psychotic symptoms may arise in relatively later stages of psychopathological development, other issues such as cognitive impairments and poor social functioning may be present already in relatively early phases [30]. Since these domains have been shown to be predictive of later functioning [28,31,32], it may be that the individuals with psychiatric disorders with additional psychotic symptoms represent a subgroup of adolescents in which psychotic symptoms are an expression of such impairments.

Table 4 Psychotic symptoms predicting functioning stratified for good and poor coping

	Patients without psychotic symptoms (N = 56)	Patients with psychotic symptoms (N = 50)
		OR 95% CI p-value
Good coping		
Less use of avoidance-oriented coping	a	0.47 0.16, 1.37 0.165
More use of approach-oriented coping	a	0.41 0.13, 1.33 0.137
Poor coping		
More use of avoidance-oriented coping	a	**0.23** 0.06, 0.90 0.034
Less use of approach-oriented coping	a	**0.24** 0.08, 0.75 0.015

a: reference category. ORs given in bold are significant at α=0.05.

Individuals with psychiatric disorders and additional psychotic symptoms reported both poorer coping and poorer functional outcome. This, in combination with the suggestive moderation effect of coping, suggests that individuals with psychotic symptoms may be less able to handle stressful situations and that this may affect their functioning in daily life. This is especially problematic since many studies have demonstrated strong associations between stress and/or trauma and psychotic development. These associations can be bidirectional. A large body of literature has shown that trauma can lead to psychotic development [33,34]. Vice versa, many studies have reported that stressful situations such as trauma [34-36] and stressful life events [37,38] are more prevalent in individuals with psychotic symptoms and that stressful events often precede exacerbation of psychotic symptomatology [38]. In fact, exposure to early adversities has been shown to sensitize an individual to pathogenic effects of later stressful life events in the context of psychosis [39]. However, other studies have reported *fewer* stressful life events in individuals with recent-onset schizophrenia [40] and *fewer* daily hassles in individuals at Ultra High Risk (UHR) for psychosis [41], although these individuals did perceive the adverse events that they encountered as less controllable, less well handled and more distressing. A study by Docherty and colleagues [37] furthermore showed that life events only lead to increases in symptom level in those patients who were most emotionally reactive to stress. Thus, it seems that a heightened sensitivity to stress may be the driving

force in the pathogenic effect of environmental stress. This is in line with a large body of literature that has shown that individuals who are liable to psychosis are thought to be more sensitive to stress [42]: patients with psychotic disorder as well as their healthy siblings [43,44], individuals considered at UHR for psychosis [41], individuals with schizotypal personality disorder [38] and individuals from the general population at heightened psychometric risk for psychosis [45] all have been shown to be more reactive to stressful events.

Limitations

The findings of the current study should be interpreted in light of its strengths and limitations. Important strengths include the thorough assessment of psychiatric disorders, using a reliable, valid and widely used diagnostic interview conducted by highly trained professionals, the relatively large sample size for an in-depth interview study, and the clinical case-clinical control design. Also, the study focused not only on non-adaptive coping, as is the case with most research on coping, but also incorporated adaptive coping. In this way, it underlined the relative nature of coping, by showing that it is not so much the yes/no application of certain coping styles, but the degree to which one applies good or poor coping. Inevitably, the use of clinical in-depth interviews limits the use of extensive samples; as a result, the subgroup analyses involved smaller groups and, because of this, confidence intervals are wide in some cases. This limited statistical power may well explain why no significant moderation effects were found and replication of the study is therefore warranted. Another limitation is that since the analyses pertained to cross-sectional data, no conclusions regarding causality or directionality of the effects can be drawn. Use of illicit drugs that may be associated with the presence of psychotic symptoms was not taken into account in the current paper. Last, since only those patients were included who could be offered clinical service within 4 weeks of referral, the current sample may have relatively high levels of psychopathology. However, this 'enrichment' for psychopathological severity enabled us to test the association between the psychotic symptoms and functional outcome with maximal statistical power. Future research may address the development of coping and its moderating role between psychotic symptoms and functional outcome over time, ideally in the context of a larger intervention study.

Clinical implications

We have demonstrated that individuals with psychotic symptoms have poorer coping skills, which may make them less capable of managing these stressors in a healthy and effective way. Thus, stress seems to be, at least partly, in the eye of the beholder; this has important clinical implications with regard to our current findings, as our results suggestively show that having both psychotic symptoms and poorer coping leads to poorer functioning. Intervention strategies aimed at improving coping skills could offer important possibilities for attenuating this association, and thus potentially improving functional outcome. Coping has been shown to be modifiable through stress management [5] and, more specifically in the context of psychosis, psychosocial interventions such as cognitive behavioral therapy (CBT) have shown potential in modifying coping in individuals with psychotic symptoms [46-48]. When looking more in-depth at the specific coping items of the ACS, it can be seen that the items loading highest on the avoidance-oriented coping factor were 'not coping', 'self-blame', 'wishful thinking' and 'worry'. The finding that avoidance-oriented coping is strongly expressed through these particular types of coping styles suggests that such feelings, cognitions and actions may deserve extra attention when offering clinical help. Similarly, items that loaded the highest on the approach-oriented coping factor were 'seek relaxing diversions', 'focus on the positive' and 'physical recreation'. Therefore, such measures are not merely common sense advice, but represent strong expressions of approach-oriented coping and thus, their importance should be underlined when discussing potential improvements regarding coping. Encouraging patients to apply these easy-to-use strategies may form an accessible and easy route for better coping and, in turn, better functioning.

When addressing the concept of coping for assessment, intervention or research purposes, it should be kept in mind that coping is a very dynamic concept. Not only may coping styles and skills change dramatically during adolescence [20,49], coping styles and skills have also been shown to change and develop in the course of disease development and recovery [8]. Furthermore, coping is assumed to show large individual differences based on factors such as personality, individual history and social context [2,50]. However, this dynamic nature is, in fact, advantageous in that it suggests that individuals can actively influence its development; this in turn may enhance feelings of control and empowerment that are vital for healthy recovery in individuals with psychosis [8,51].

Conclusions

Non-adaptive coping and poorer functioning were more often present in adolescents with non-psychotic psychiatric disorders and additional psychotic symptoms. Due to small subgroups, our analyses could not give definitive conclusions about the question whether coping moderated the association between psychotic symptoms and functioning. Improvement of coping skills may form

an important target for intervention that may contribute to better clinical and functional outcomes in patients with psychotic symptoms.

Competing interests
The authors declare that they have no competing interests.

Authors' contributions
JW performed the analyses and wrote the manuscript. ND participated in the design and coordination of the study and helped to draft the manuscript. IK contributed to the analyses and writing of the manuscript. AM and AK participated in the coordination and data collection of the study and drafting of the manuscript. MH helped with the drafting of the manuscript. CF and MC conceived of the study, participated in its design and coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

Acknowledgements
MC was supported by a Clinician Scientist Award from the Health Research Board (Ireland) (CSA/2004/1). This work was also supported by the European Community's Seventh Framework Programme under grant agreement number HEALTH-F2-2009-241909 (Project EU-GEI), the Brain & Behavior Research Foundation/NARSAD and the Health Research Board (Ireland). CF, ND and AK were supported by a Health Service Research and Development Grant (ref. no. HS/2005/7). A travel grant for the collaboration was awarded to JW by the Dutch "Stichting Koningsheide". None of these funding resources had any role in study design, the collection, analysis, and interpretation of data, in the writing of the manuscript and in the decision to submit the manuscript for publication.

Author details
[1]Department of Psychiatry, Royal College of Surgeons in Ireland, Education and Research Centre Dublin, Dublin, Ireland. [2]Department of Psychiatry and Neuropsychology, School of Mental Health and Neuroscience, Maastricht University Medical Centre Maastricht, Vijverdalseweg 1, 6226 NB Maastricht, the Netherlands. [3]St Joseph's Adolescent Unit, St Vincent's Hospital Fairview Dublin, Dublin, Ireland. [4]Department of Clinical Psychology, Queen's University, Belfast, Northern Ireland. [5]Department of Child and Adolescent Psychiatry, University College Dublin, Dublin, Ireland. [6]Department of Psychiatry, Beaumont Hospital Dublin, Dublin, Ireland.

Received: 28 May 2013 Accepted: 13 March 2014
Published: 1 April 2014

References
1. Gunnar MR, Vaszquez D: *Stress neurobiology and developmental psychopathology. Developmental psychopathology*, Developmental Neuroscience, Volume II. Secondth edition. Hoboken, New Jersey: Wiley & Sons, Inc; 2006:533–577.
2. Kessler RC, Price RH, Wortman CB: **Social factors in psychopathology: stress, social support, and coping processes.** *Ann Rev Psychol* 1985, **36**(1):531–572.
3. Gunnar MR, Quevedo K: **The neurobiology of stress and development.** *Annu Rev Psychol* 2007, **58:**145–173.
4. Lazarus RS, Folkman S: *Stress, appraisal, and coping.* New York: Springer Publishing Company; 1984.
5. Taylor SE, Stanton AL: **Coping resources, coping processes, and mental health.** *Annu Rev Clin Psychol* 2007, **3:**377–401.
6. Phillips LJ, Francey SM, Edwards J, McMurray N: **Strategies used by psychotic individuals to cope with life stress and symptoms of illness: a systematic review.** *Anxiety Stress Copin* 2009, **22**(4):371–410.
7. Ritsner MS, Ratner Y: **The long-term changes in coping strategies in schizophrenia: temporal coping types.** *J Nerv Ment Dis* 2006, **194**(4):261–267.
8. Roe D, Yanos PT, Lysaker PH: **Coping with psychosis: an integrative developmental framework.** *J Nerv Ment Dis* 2006, **194**(12):917–924.
9. Van Os J, Linscott R, Myin-Germeys I, Delespaul P, Krabbendam L: **A systematic review and meta-analysis of the psychosis continuum: evidence for a psychosis proneness-persistence-impairment model of psychotic disorder.** *Psychol Med* 2009, **39**(2):179–195.
10. Kelleher I, Connor D, Clarke MC, Devlin N, Harley M, Cannon M: **Prevalence of psychotic symptoms in childhood and adolescence: a systematic review and meta-analysis of population-based studies.** *Psychol Med* 2012, **1**(1):1–7.
11. Kelleher I, Keeley H, Corcoran P, Lynch F, Fitzpatrick C, Devlin N, Molloy C, Roddy S, Clarke MC, Harley M, Arseneault L, Wasserman C, Carli V, Sarchiapone M, Hoven C, Wasserman D, Cannon M: **Clinicopathological significance of psychotic experiences in non-psychotic young people: evidence from four population-based studies.** *Br J Psychiat* 2012, **201**(1):26–32.
12. Kelleher I, Lynch F, Harley M, Molloy C, Roddy S, Fitzpatrick C, Cannon M: **Psychotic symptoms in adolescence index risk for suicidal behaviour: findings from two population-based case–control clinical interview studies.** *Arch Gen Psychiatry* 2012, **69**(12):1277–1283.
13. Wigman JTW, van Nierop M, Vollebergh WAM, Lieb R, Beesdo-Baum K, Wittchen HU, van Os J: **Evidence that psychotic symptoms are prevalent in disorders of anxiety and depression, impacting on illness onset, risk, and severity—implications for diagnosis and ultra–high risk research.** *Schizophr Bull* 2012, **38**(2):247–257.
14. Perlis RH, Uher R, Ostacher M, Goldberg JF, Trivedi MH, Rush AJ, Fava M: **Association between bipolar spectrum features and treatment outcomes in outpatients with major depressive disorder.** *Arch Gen Psychiat* 2011, **68**(4):351.
15. Wigman JTW, van Os J, Abidi L, Huibers MJH, Roelofs J, Arntz A, Kelleher I, Peeters FPML: *Subclinical psychotic experiences and bipolar spectrum features in major depressive disorder: association with outcome of psychotherapy. Psychol Med* 2013. doi:10.1017/S0033291713000871.
16. Yanos P, Moos R: **Determinants of functioning and well-being among individuals with schizophrenia: an integrated model.** *Clin Psychol Rev* 2007, **27**(1):58–77.
17. Dangelmaier RE, Docherty NM, Akamatsu TJ: **Psychosis proneness, coping, and perceptions of social support.** *Am J Orthopsychiat* 2006, **76**(1):13–17.
18. Fonseca-Pedrero E, Lemos-Giraldez S, Paino ME, Sierra-Baigrie S, Villazon-Garcia U, Bobes J, Muniz J: **Coping strategies in adolescents with psychotic-like experiences. [Conference Abstract].** *Europ Psychiat* 2010, **25**(Supp 1):1592.
19. Jalbrzikowski M, Sugar CA, Zinberg J, Bachman P, Cannon TD, Bearden CE: **Coping styles of individuals at clinical high risk for developing psychosis.** *Early Intervention Psychiat* 2012. doi:10.1111/eip.12005.
20. Lin A, Wigman JTW, Nelson B, Vollebergh WAM, van Os J, Baksheev G, Ryan J, Raaijmakers QAW, Thompson A, Yung AR: **The relationship between coping and subclinical psychotic experiences in adolescents from the general population–a longitudinal study.** *Psychol Med* 2011, **41**(12):2535–2546.
21. Kaufman J, Birmaher B, Brent D, Rao U, Flynn C, Moreci P, Williamson D, Ryan N: **Schedule for affective disorders and schizophrenia for school-age children-present and lifetime version (K-SADS-PL): initial reliability and validity data.** *J Am Acad Child Psy* 1997, **36**(7):980–988.
22. Chambers WJ, Puig-Antich J, Hirsch M, Paez P, Ambrosini PJ, Tabrizi MA, Davies M: **The assessment of affective disorders in children and adolescents by semistructured interview: test-retest reliability of the schedule for affective disorders and schizophrenia for school-age children, present episode version.** *Arch Gen Psychiat* 1985, **42**(7):696–702.
23. Shaffer D, Gould MS, Brasic J, Ambrosini P, Fisher P, Bird H, Aluwahlia S: **A children's global assessment scale (CGAS).** *Arch Gen Psychiat* 1983, **40**(11):1228–1231.
24. Frydenberg E, Lewis R: **Boys play sport and girls turn to others: age, gender and ethnicity as determinants of coping.** *J Adolescence* 1993, **16**(3):253–266.
25. O'Connor BP: **SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test.** *Behav Res Methods* 2000, **32**(3):396–402.
26. Kelleher I, Devlin N, Wigman JTW, Kehoe A, Murtagh A, Fitzpatrick C, Cannon M: **Psychotic experiences in a mental health clinic sample: implications for suicidality, multimorbidity and functioning.** *Psychol Med* 2013**:**1–10. http://dx.doi.org/10.1017/S0033291713002122.
27. Malla A, Payne J: **First-episode psychosis: psychopathology, quality of life, and functional outcome.** *Schizophr Bull* 2005, **31**(3):650–671.
28. Lin A, Wood SJ, Yung AR: **Measuring psychosocial outcome is good.** *Curr Opin Psychiatr* 2013. doi:10.1097/YCO.0b013e32835d82aa.
29. Wardenaar KJ, Wigman JTW, Lin A, Killackey E, Collip D, Wood SJ, Ryan J, Beksheev G, Cosgrave E, Nelson B, Yung AY: **Development and validation of a new measure of everyday adolescent functioning: the multidimensional adolescent functioning scale.** *J Adol Health* 2013, **52:**195–200.
30. Keshavan MS, DeLisi LE, Seidman LJ: **Early and broadly defined psychosis risk mental states.** *Schizophr Res* 2011, **126**(1–3):1–10.
31. Lin A, Wood SJ, Nelson B, Brewer WJ, Spiliotacopoulos D, Bruxner A, Broussard C, Pantelis C, Yung AR: **Neurocognitive predictors of functional**

outcome two to 13 years after identification as ultra-high risk for psychosis. *Schizophr Res* 2011, **132**:1–7.
32. Carrión RE, McLaughlin A, Goldberg TW, Auther AM, Olsen RH, Olvet DM, Correll CU, Cornblatt BA: **Prediction of functional outcome in individuals at clinical high risk for psychosis.** *JAMA Psychiatr* 2013, **70**(11):1133–1142.
33. Morgan C, Fisher H: **Environment and schizophrenia: environmental factors in schizophrenia: childhood trauma—a critical review.** *Schizophr Bull* 2007, **33**(1):3–10.
34. Varese F, Smeets F, Drukker M, Lieverse R, Lataster T, Viechtbauer W, Read J, van Os J, Bentall RP: **Childhood adversities increase the risk of psychosis: a meta-analysis of patient-control, prospective-and cross-sectional cohort studies.** *Schizophr Bull* 2012, **38**(4):661–671.
35. Kelleher I, Harley M, Lynch F, Arseneault L, Fitzpatrick C, Cannon M: **Associations between childhood trauma, bullying and psychotic symptoms among a school-based adolescent sample.** *Br J Psychiatr* 2008, **193**(5):378–382.
36. Read J, van Os J, Morrison AP, Ross CA: **Childhood trauma, psychosis and schizophrenia: a literature review with theoretical and clinical implications.** *Acta Psychiat Scand* 2005, **112**(5):330–350.
37. Docherty NM, St-Hilaire A, Aakre JM, Seghers JP: **Life events and high-trait reactivity together predict psychotic symptom increases in schizophrenia.** *Schizophr Bull* 2009, **35**(3):638–645.
38. Tessner KD, Mittal V, Walker EF: **Longitudinal study of stressful life events and daily stressors among adolescents at high risk for psychotic disorders.** *Schizophr Bull* 2011, **37**(2):432–441.
39. Lataster J, Myin-Germeys I, Lieb R, Wittchen HU, van Os J: **Adversity and psychosis: a 10-year prospective study investigating synergism between early and recent adversity in psychosis.** *Acta Psychiat Scand* 2011, **125**(5):388–399.
40. Horan WP, Ventura J, Nuechterlein KH, Subotnik KL, Hwang SS, Mintz J: **Stressful life events in recent-onset schizophrenia: reduced frequencies and altered subjective appraisals.** *Schizophr Res* 2005, **75**(2):363–374.
41. Phillips LJ, Edwards J, McMurray N, Francey S: **Comparison of experiences of stress and coping between young people at risk of psychosis and a non-clinical cohort.** *Behav Cogn Psychother* 2012, **40**(1):69–88.
42. Myin-Germeys I, van Os J: **Stress-reactivity in psychosis: evidence for an affective pathway to psychosis.** *Clin Psychol Rev* 2007, **27**(4):409–424.
43. Myin-Germeys I, van Os J, Schwartz JE, Stone AA, Delespaul PA: **Emotional reactivity to daily life stress in psychosis.** *Arch Gen Psychiat* 2001, **58**(12):1137–1144.
44. Myin-Germeys I, Krabbendam L, Delespaul PA, van Os J: **Do life events have their effect on psychosis by influencing the emotional reactivity to daily life stress?** *Psychol Med* 2003, **33**(02):327–333.
45. Lataster T, Wichers T, Jacobs N, Mengelers M, Derom C, van Thiery E, Os J, Myin-Germeys I: **Does reactivity to stress cosegregate with subclinical psychosis? A general population twin study.** *Acta Psychiat Scand* 2009, **119**(1):45–53.
46. Farhall J, Greenwood KM, Jackson HJ: **Coping with hallucinated voices in schizophrenia: a review of self-initiated strategies and therapeutic interventions.** *Clin Psychol Rev* 2007, **27**(4):476–493.
47. Mortan O, Sutcu PST, Kose GG: **A pilot study on the effectiveness of a group-based cognitive-behavioral therapy program for coping with auditory hallucinations.** *Turkish J Psychiat* 2011, **22**(1):1–8.
48. Sarin F, Wallin F, Widerlöv B: **Cognitive behavior therapy for schizophrenia: a meta-analytical review of randomized controlled trials.** *Nordic J Psychiat* 2011, **65**(3):162–174.
49. Compas BE, Connor_smith JK, Saltzman H, THomson A, Wadsworth ME: **Coping with stress during childhood and adolescence: problems, progress, and potential in theory and research.** *Psychol Bull* 2001, **127**(1):87–127.
50. Coyne JC, Downey G: **Social factors and psychopathology: stress, social support, and coping processes.** *Ann Rev Psychol* 1991, **42**(1):401–425.
51. Grealish A, Rai S, Hunter A, Morrison AP: **Qualitative exploration of empowerment from the perspective of young people with psychosis.** *Clin Psychol Psychot* 2013, **20**(2):136–148.

doi:10.1186/1471-244X-14-97
Cite this article as: Wigman *et al.*: Psychotic symptoms, functioning and coping in adolescents with mental illness. *BMC Psychiatry* 2014 **14**:97.

Submit your next manuscript to BioMed Central and take full advantage of:

- **Convenient online submission**
- **Thorough peer review**
- **No space constraints or color figure charges**
- **Immediate publication on acceptance**
- **Inclusion in PubMed, CAS, Scopus and Google Scholar**
- **Research which is freely available for redistribution**

Submit your manuscript at
www.biomedcentral.com/submit

BioMed Central