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Title: Early Persistence of Psychotic-Like Experiences in a community sample of adolescents

Running title: Persistent Psychotic experiences in adolescents

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Abstract (246 words)

Aims: Psychotic-like experiences (PLEs) are common in adolescents. Their persistence may confer increased susceptibility to psychotic disorder. The early evolution of transient to persistent PLEs is not well known. This study aimed to investigate the early persistence of PLEs (over 6-12 months) in a community sample of adolescents and examine baseline and longitudinal associations of early persistent PLEs.

Methods: Five hundred and ninety Year 10 students were administered the Community Assessment of Psychic Experiences (CAPE) to measure PLEs at baseline and at follow up 6-12 months later. Persistent PLEs were defined as those present at or above the 90th centile at both time points. Independent variables of depression, psychological distress and functioning were all measured at both baseline and follow up. Self-esteem, personality and suicidality were assessed at follow up.

Results: The study found 5.1% of participants had early persistent PLEs. Persistence was associated positively with depression and distress at both time points, neuroticism and openness at baseline and suicidality at follow up. Persistence was negatively associated with functioning at both time points, agreeableness at baseline and self-esteem at follow-up. Only depression remained significantly associated at both time points when accounting for other variables. Thus, depressive symptoms may account for changes in other domains and be a predictor of early PLEs persistence.

Conclusions: These results reinforce the importance of monitoring and assessing PLEs in young people especially when associated with depression. Further research is required to investigate PLE persistence over longer periods with increased measurement intervals.

KEYWORDS: depression, persistence, psychosis, Psychotic-like experience, psychotic symptoms

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INTRODUCTION

Psychotic experiences occur on a continuum, between non-distressing experiences of low intensity, to those of high intensity and distress, as seen in psychotic disorders such as schizophrenia. Terminology is inconsistent in the literature. A recent review (Seiler, Nguyen, Yung & O'Donoghue, 2020) recommends that the terms “psychotic-like experiences” or “psychotic experiences” are used for experiences that are low in intensity and distress. This contrasts with “attenuated psychotic symptoms” which are distressing although below the threshold for a diagnosis of psychotic disorder. These are characteristic of the “At Risk Mental State” (also known as the Ultra High Risk or Clinical High-Risk state)(Fusar-Poli et al., 2013). They include, for example, unusual thoughts that are not held with delusional conviction and abnormal perceptual experiences that are not true hallucinations, i.e. they do not have the quality of true perceptions.

The prevalence of psychotic-like experiences (PLEs) in general populations is high, from 17.5% (lifetime prevalence) to 98%(one PLE at least sometimes), depending on the criteria and group studied(Van Os, Hanssen, Bijl & Vollebergh, 2001; Yung et al. 2005). A meta-analysis found the prevalence of PLEs to be 8% (Van Os et al., 2008) which is even higher in children and adolescents (Nelson, Fusar-Poli & Yung, 2012; Scott et al. 2009, Kelleher et al. 2012; Majjer, Begemann, Palmen, Leucht & Sommer, 2017). PLEs during childhood and adolescence are associated with increased risk for developing both psychotic and non-psychotic disorders (Healy et al. 2019) although most PLEs do not develop into psychotic disorder. Rather, the majority of PLEs occurring during adolescence are likely to be transient (Zammit et al. 2013) and may not be associated with any clinical syndrome. However, adolescents have the greatest incidence of

first episode psychosis (Simon et al. 2017), highlighting the need to identify those PLEs that are likely to develop into future psychopathology. Individuals with these PLEs may benefit most from early interventions.

The persistence of PLEs may indicate susceptibility for transition into mental health disorder. Previous studies (Dominguez, Wichers, Lieb, Wittchen, & van Os, 2009; Bechtold, Hipwell, Lewis, Loeber, & Pardini, 2016) found those with persistent PLEs had a greater risk of developing psychotic disorder than those with transient PLEs. However, a recent systematic review noted the need for more research examining the persistence of PLEs in this underexplored area (Healy et al. 2019). In particular, the early course of PLEs is unknown and so the transition from potentially benign transient PLEs to riskier persistent PLEs has not been well demarcated.

Kalman et. al. (2019) conducted a scoping review that showed although many studies have investigated multiple predictors of persistent PLEs, no predictors have been replicated across studies. One of the most widely investigated factors is depression which has tended to be higher in persistent groups although not always significantly. Personality traits, functioning, self-esteem, suicidality and psychological distress (Shi et al., 2018; Haug et al., 2016; Nishida et al., 2010; Yamasaki et al., 2018) have been found to be associated with PLE prevalence.

Given these associations, and the paucity of literature in relation to risk factors for persistence of PLEs, we aimed to assess the relationship between depression, distress, suicidality, self-esteem and personality traits with PLEs. We studied (1) the early persistence of PLEs (over 6-12 months) in a community sample of adolescence. In addition, to further delineate the time course of early persistence we examined (2) baseline and longitudinal associations of early persistent PLEs. The longitudinal design provides an opportunity to investigate whether those factors associated with prevalence of PLEs can predict or are associated with their early persistence.

METHODS

Study design

Aprospective longitudinal study of Year 10 students in Melbourne, Australia with follow up at 6-12 months after initial assessment.

Subjects and Procedures

Sixty secondary schools in Melbourne, Australia were asked to participate in the study and 34 agreed to their Year 10 students being surveyed. This was made up of 20 government, five Catholic and nine independent schools.

Questionnaires were used to assess participants from each school during a 48-minute study period. Trained research assistants were available to support students in class. These questionnaires were repeated at follow-up on a second occasion approximately 6-12 months later in another 48-minute study period. All participants provided written informed consent from their parent/guardian and themselves. The study was approved by Research and Ethics Committees at the University of Melbourne, Victorian Department of Education and the Catholic Education Office.

Measures

PLEs were assessed using the Community Assessment of Psychic Experiences (CAPE) (Stefanis et al., 2002). This self-report measure is made up 42 items, with subscales of positive (20 items), negative (14 items) and depressive symptoms (8 items). The scale records both the frequency and distress associated with each item. In this study only the frequency measure (1=never, 4= nearly always) on the positive symptoms subscale was used (Total score: 20-80).

At baseline, participants were asked to assess the occurrence of PLEs in the preceding 12 months. At follow-up they were asked about PLEs since their last assessment. The CAPE has been validated in several adolescent samples (Mark & Touloupoulou, 2015). There is no predetermined threshold for high PLEs

Depression was measured using the Center for Epidemiologic Studies Depression Scale (CES-D). Twenty items are included in the CESD that rate frequency of depressive symptoms from 1 (rarely) to 4 (most of the time) (Radloff 1977). Scores ≥ 24 have been linked to caseness of depression and the scale has been validated for use in adolescents (Radloff, 1991).

Functioning was measured by the Multidimensional Adolescent Functioning Scale (MAFS). This scale is made up of 23 items scored on a 0-4 scale (0=not at all, 4= always/almost always). A higher score indicates improved functioning. MAFS has been validated for adolescents (Wardenaar et al. 2013).

The General Health Questionnaire 12 (GHQ-12) was used to assess psychological distress. It consists of 12 items including both depressive and anxiety symptom items. Each item is scored 0-3 and total scores of ≥ 12 have been associated with caseness of psychological distress (Goldberg et al. 1997). The GHQ-12 has been previously validated for adolescents (D'Arcy & Siddique, 1984; Radovanović & Erić, 1983).

Self-esteem was measured at follow up using the Rosenberg Self-Esteem inventory (RSE). This is 10 item scale where each item is rated 1-4 (1-strongly disagree, 4-strongly agree). An increase in cumulative score indicates higher self-esteem (Rosenberg, 1965). It has been validated in adolescents (Whiteside-Mansell & Corwyn, 2003).

The Neuroticism-Extraversion-Openness Five Factor Inventory (NEO-FFI) was used at follow up to measure personality traits (60 items) where items are scored on a Likert scale 1-4. These scores measure traits across five personality domains: neuroticism, extraversion, openness to

experience, agreeableness and conscientiousness (McCrae & Costa, 2004). Personality traits are relatively enduring (Roberts & DelVecchio, 2000) and have a high relative trait consistency in all age groups (Srivastava, John, Gosling and Potter, 2003). Therefore, they were unlikely to change significantly during the brief interval between baseline and follow-up, despite adolescents being less stable than adult groups (Pullman, Raudsepp & Allik, 2006). For that reason, personality traits have been included with other baseline variables for analyses.

The Youth Risk Behaviour Survey (YRBS) was used at follow up to assess for suicidality. The YRBS assesses a wide range of health issues (Centers for Disease Control and Prevention, 2009) but for the purposes of this analysis, the 5 suicidality items from the YRBS were included rather than the overall total score. May and Klonsky (2011) have previously demonstrated the discriminative and convergent validity of suicidality items of the YRBS. YRBS items 7-11 were dichotomised as 0 and 1; items 7-9 (yes=0, no=1) item 10 (0=no attempted suicide, 1=any suicide attempt) and item 11 (0=no suicide attempt or no harm from attempt, 1=harm from suicide attempt). The scores for each of the five items was summed to give a total score (0-5).

Data analyses

Analyses were performed using Statistical Package for the Social Sciences (SPSS) version 22 for Windows. As true subclinical PLE prevalence is approximately 8% but higher in adolescents (Van Os et al., 2008; Nelson et al. 2012), participants who had total CAPE scores at or above the 90th percentile at both baseline and follow up (CAPE score= 41- baseline, 36- follow up) were classified as having high levels of PLEs. Total scores at baseline and follow-up were dichotomised on whether they met the threshold for high PLEs.

Persistence was defined as high PLEs at both baseline and follow-up. The participants were dichotomised on whether they met these criteria for persistence. Participants were classified

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either persistent PLEs ($\geq 90^{\text{th}}$ centile CAPE score at both time points) or non-persistent PLEs ($\leq 90^{\text{th}}$ centile CAPE score at one or both time points).

To identify risk factors for PLEs and associations, potential variables were first assessed for normality using Q-Q plots. Non-parametric distributions were logged. Laverne's test assessed the equality of variances. Then independent t-tests assessed mean differences between persistent and non-persistent PLEs. Significant variables were included in binary logistic regression, both univariate and multivariate, to assess for effects and associations with early persistent PLEs. These regressions produced unadjusted and adjusted odds ratios.

RESULTS

Sample

The patient flow of the total possible sample of 4797 are found in Figure 1. Only 590 had sufficient CAPE data at both timepoints, which were used for further statistical analyses. Attrition was not associated with any significant differences in suicidality, gender, age, depression, psychological distress or functioning, Attrition was associated with lower CAPE scores ($p=.020$) but the mean difference was only 1.41 on the scale which is clinically negligible. The mean follow-up time was 410 days (range: 90-726) and there was a significant difference in follow-up times ($t(33)=2.34$, $p=.025$); those with persistent PLEs were more likely to have shorter follow-up times than those with non-persistent PLEs (MD=62 days). In order to account for this effect, follow-up time was included in logistic regression.

INSERT FIGURE 1

Twenty of 28 Government schools that were approached agreed to participate, compared to five out of 17 Catholic schools and nine out of 15 independent schools. Government schools were significantly more likely than Catholic schools to participate ($\chi^2(1) = 7.563$, $p=.006$).

Of those with sufficient CAPE data at both time points 46.6%(274) were male while females made 53.4% (314). The mean age was 15.6 (SD 2.64) and 16.6 (SD 0.58) at baseline and follow-up respectively, with no significant difference between sexes.

Early Persistence of PLEs

Of participants at baseline and follow-up, 99.2% and 98.6% experienced at least 1 PLE “at least sometimes” respectively. However, when a more stringent cut off of experiencing a PLE “nearly always” is used only 27.9% at baseline and 18.8% at follow-up did so. As shown in Table 1 ninety-seven participants (11.4%) at baseline and seventy-one (11.6%) participants at follow up had high levels of PLEs. Overall, only 30 participants (5.1%) met the 90th centile threshold at both time points and had early persistent PLEs. Thirty-two participants (5.4%) at baseline and forty participants (6.8%) at follow up had high PLEs at one time only. These 72 participants were included with 488 participants who did not have high PLEs at either time point in the non-persistent PLEs group. Overall females showed a higher rate of early persistence (6.4%) compared to males (3.8%) and made up 66.6% (n=20) of the persistent PLEs group.

INSERT TABLE 1

Baseline associations of early persistent PLEs

T-tests indicated a significant difference between early persistent PLEs compared with non-persistent PLEs for all baseline variables except Extroversion and Conscientiousness factors on the NEO scale (see Table 2). Early persistent PLEs were associated with increased depressive symptoms, psychological distress, open mindedness and neuroticism as well as decreased functioning, follow-up time and agreeableness.

Using univariate binary logistic regression all measurements were significant as shown in table 4. In multivariate analysis, only depressive score remained significant [OR 1.11 (95% CI 1.04-

1.18), $p=.003$]. For every 1 unit increase in CES-D score there is a 10.7% increase in the probability of having persistent PLEs.

Longitudinal associations of early persistent PLEs

At follow-up, independent T-test analyses indicated all variables were significantly different between the persistent PLEs and non-persistent PLEs groups, as shown by Table 3. Early persistent PLEs were associated with increased depressive symptoms, psychological distress and suicidality, decreased functioning, follow-up time and self-esteem.

Univariate analysis from simple logistic regression showed all five variables to be significantly associated with persistent PLEs as shown in table 4. In multivariate analysis, accounting for all variables, only depressive score [OR: 1.09 (CI:1.02-1.16) $p=.010$] remained significant. For every 1 unit increase in CES-D score there is an 8.6% increase in the likelihood of having persistent PLEs.

INSERT TABLES 2, 3 AND 4

DISCUSSION

Early Persistence of PLEs

The prevalence of PLEs was high in this adolescent community sample. Although almost all participants had experienced PLEs using a broad criteria of “at least sometimes”, applying a more narrow-criteria of “nearly always” reduced the prevalence to 18-28% which is consistent with other adolescent PLE prevalence studies (Poulton et al., 2000, Kendler, 1996, van Os, Bijl & Ravelli, 2000). This reinforces the need for a gold standard assessment and definition of PLEs to increase consistency across studies (Lee et. al. 2015). Only 5.1% ($n= 30$) of participants showed early persistent PLEs. The rate of early persistence over 6-12 months was more than double the persistent PLEs Zammit et al. (2013) found over 6 years, from age 12

to age 18 (2.5%). This may be due to the different methodologies between the studies. For example, Zammit et al. (2013) assessed presence of psychotic experiences via interview whilst we used a self-report measure. Although self-report has been validated alongside interview techniques to measure PLEs, they may still overestimate the presence of PLEs as there is no opportunity to clarify experiences (Nelson et al. 2012). The follow up interviews at aged 18 in the Zammit et al. (2013) study asked about psychotic experiences since aged 12, and therefore may have been influenced by problems with recall over the preceding 6 years. Additionally, both studies suffered from attrition, following up 67.4% and 59.7% of participants in this study and Zammit et al. respectively. The higher rate of early persistence may also be due to resolution of psychotic experiences in some individuals over a longer follow up time. This reflects the distinct group of those with early persistent PLEs being identified at an earlier point in their trajectory from transitory to persistent PLEs.

Risk Factors and associations for Early Persistent PLEs

We found that risk factors for the prevalence of PLEs are also associated with their early persistence (Haug et al. 2016, Nishida et al. 2010). Early persistent PLEs were associated with increased depression, psychological distress (both timepoints) and suicidality (at follow-up) and decreased functioning (both timepoints) and self-esteem (at follow-up). These associations were no longer significant after adjusting for depression.

Increased neuroticism and openness and decreased agreeableness were related to early persistent PLEs. These associations were no longer significant after adjusting for depression. This may be due to overlap between Neuroticism traits and depression and that people with high Agreeableness are less likely to experience depression (Hayward, Taylor, Smoski, Steffens, & Payne, 2012). Personality traits have been linked to the prevalence of PLEs but have to date only been investigated in one other study on PLE persistence (Bourque et. al. 2017). Further research is required to disentangle the relationship between personality traits

and depression scores to see how each impacts the trajectory of the other and PLEs over a longer period of time.

PLEs are associated with a range of poor outcomes, including increased risk of both psychotic and non-psychotic disorders (Lin et al. 2015) as well as increased internalising and externalising problems (Healy et al. 2019). This indicates that PLEs appear to be a transdiagnostic marker of mental health problems and confer increased risk of psychopathology in general. Persistent PLEs in particular have been associated with increased risk of psychotic disorders while their relationship to non-psychotic disorders has been under investigated (Healy et al. 2019).

Our study has been able to capture individuals earlier in the trajectory of disorder by identifying those with early persistent PLEs. This provides support underlying changes in depressive symptoms is closely related to early persistent PLEs. This raises questions for the underlying pathophysiology of PLEs, which is unknown, but as stated by Yung and Lin (2016) is likely to represent a heterogeneous group; some indicating a neurodevelopmental disorder, some being part of a non-psychotic disorder and some being of no clinical significance (see figure 2a). The early persistence of PLEs being related to depression could be transdiagnostic, reflecting common environmental factors interacting with common genetic predisposition for both psychotic and depressive disorders (figure 2b) (Domschke, 2013). This highlights the need to clinically focus on addressing PLEs themselves; their persistence, severity, distress and depressive symptoms to reduce the risk for all future mental health problems. However, it is important to note depression also commonly occurs in the prodromal phase of schizophrenia (Yung & McGorry, 1996) and the predictive ability of depressive symptoms may reflect an increased propensity to develop prodromal “At Risk Mental State” rather than a mood disorder. Further longitudinal study of this early persistent group will help distinguish between these two possible explanations.

INSERT FIGURE 2

Zammit et al. (2013) has previously advocated for the need for strong and specific predictors for clinical psychoses and these findings have begun to delineate the course of development of early PLEs. Whether or not pre-existing depressive symptoms precipitate the emergence of early persistent PLEs from transient PLEs or whether they both develop due to common underlying causes can only be confirmed by further longitudinal study. Nonetheless, from a clinical point of view it is important to assess and monitor PLEs especially when they are associated with depression in young people. Given that treatment of depression may reduce PLEs (Yung et. al. 2007), and that depression itself is distressing and associated with a range of poor outcomes in young people (Clayborne, Varin & Colman, 2019), interventions to treat depression are warranted. Consistent with the staging model, interventions should match the level of symptoms and disability and aim to prevent progression to later stages (McGorry, Hickie, Yung, Pantelis & Jackson, 2006).

Limitations

Although a subgroup of persistent PLEs over 6-12 months was identified, participants were only assessed on two occasions. This does not account for fluctuations between measurements and may lead to overrepresentation of individuals whose experiences remitted during the interval. Given that PLEs in adolescence may be transient, persistence over 6-12 months does not indicate persistence beyond this timeframe. It does however provide an insight into the early course of PLEs and how they may develop into persistent PLEs. The variation in follow-up times between participants is a limitation. Although we were able to account for the significant difference in follow-up times between groups by including follow-up times in logistic regression, ideally follow-up times would have been kept consistent. Including adolescents from a range of school types provides a more representative and diverse sample. However, we were not able to compare the difference in CAPE score by school type and how that might impact the prevalence of PLEs.

A third (30.42%) of participants overall and a third (36%) of participants with high PLEs at baseline were lost to follow up. This could indicate underrepresentation of persistent PLEs as those with the most severe symptoms may not have been able to complete the follow-up assessment day. However, the proportion of high and low PLEs lost to follow-up is similar and attrition was related to a marginally lower score on the CAPE at baseline, both of which indicate the sample included in the study is likely to be representative of community adolescent samples.

The use of self-report measures means participants may have misinterpreted items leading to misrepresentation of the prevalence and persistence of PLEs. However, research assistants were on hand to clarify questions and to minimise this effect. In addition, the CAPE has been found to be highly correlated with interview assessed PLEs (Konings, Bak, Hanssen, van Os & Krabbendam, 2006).

Although we have argued that personality traits are unlikely to change between the two time points, the fact that personality traits were used as a baseline predictor while being measured at follow-up is an additional limitation.

CONCLUSION

The current longitudinal study has identified a sub-group with early persistent PLEs. These were associated with high levels of depression. Accessible services are needed so that such adolescents can seek help in a non-stigmatising environment where their PLEs and depression can be assessed and monitored. Australia, Ireland and Canada have such services known as “headspace centres”, “Jigsaw” and “Access open minds” respectively (Malla et al. 2015). In the UK a service for individuals aged 0-25 has recently been established in Birmingham.

Longer periods of follow up and increased measurement intervals are required to confirm the presence of an early persistent PLE subgroup and to further understand the evolution of developing early persistent PLEs.

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Conflict of Interest statement

The authors have declared that there are no conflicts of interest in relation to this study.

Data availability

Data available on request from the authors

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Tables

TABLE 1: Participants at baseline and follow up separated by Level of Psychotic-like Experiences (PLEs)

		Follow-Up		
		Low PLEs	High PLEs	Total
Baseline	Low PLEs	488 (82.7%)	40 (6.8%)	528
	High PLEs	32 (5.4%)	30 (5.1%)	62
	Total	520	70	590

TABLE 2: Independent T-tests comparing participants with Persistent Psychotic-like experiences (PLEs) and Non-Persistent PLEs at baseline

Baseline	M (SD)				Mean difference (95%CI)	t (df)	Significance (p)
	Non-	n ^a	Persistent	n ^b			
	Persistent	560		30			
Depression <i>CES-D</i>	13.49 (9.72)	560	28.33 (10.90)	30	-14.85 [-18.45, -11.25]	8.10 (588)	<.001
Functioning <i>MAFS</i>	72.93 (9.97)	550	64.33 (12.34)	27	8.59 [3.65,12.54]	3.56 (28)	.001
Psychological Distress <i>GHQ</i>	11.08 (5.92)	549	17.41 (7.46)	29	-6.33 [-9.21, -3.46]	4.5 (30)	<.001
Personality <i>NEO-FFI</i>		553		29			
-Agreeableness	41.73 (5.00)		37.83 (4.74)		3.90 [2.04,5.77]	4.11 (580)	<.001
-Openness	38.43 (5.92)		41.41 (6.14)		-2.98 [-5.20, -0.76]	2.64 (580)	.009
-Neuroticism	32.15 (7.93)		41.31 (8.39)		-9.16 [-12.41, -0.60]	6.04 (580)	<.001
-Extroversion	42.50 (5.87)		40.34 (7.10)		2.16 [-0.06,4.38]	1.91 (580)	.057
-Conscientiousness	41.39 (7.22)		38.90 (7.40)		-2.98 [-5.20, -0.76]	1.81 (580)	.070

Note: CI= confidence interval, na=number with non-persistent PLEs, nb=number with persistent PLEs

Abbreviations: CES-D = Center for Epidemiologic Studies Depression Scale MAFS = Multidimensional Adolescent Functioning Scale, GHQ= General Health Questionnaire, NEO-FFI= Neuroticism-Extroversion-Openness Five-Factor Inventory, PLE= Psychotic-like Experience

TABLE 3: Independent T-tests comparing differences between Persistent and Non-persistent groups at follow up

Follow-up Variable	M (SD)				Mean difference (95%CI)	t (df)	Significance (p)
	Non-Persistent	n ^a	Persistent	n ^b			
Depression <i>CES-D</i>	11.38 (9.02)	545	24.40 (9.85)	30	-13.02 [-16.36, -9.69]	-7.67 (587)	<.001
Functioning <i>MAFS</i>	4.34 (0.12)	531	4.20 (0.20)	30	0.14 [0.07,0.22]	3.94 (30)	<.001
Psychological Distress <i>GHQ</i>	9.65 (5.20)	544	15.5 (7.50)	30	-5.85 [-8.68, -3.02]	-4.22 (31)	<.001
Suicidality <i>YRBS</i>	0.33 (0.91)	550	1.23 (1.43)	30	-0.90 [-1.44, -0.36]	-3.40 (30)	.002
Self-esteem <i>RSE</i> [†]	3.46 (0.18)	548	3.24 (0.23)	30	0.23 [0.16, 0.29]	5.38 (31)	<.001

Note: CI= Confidence Interval, n^a=number with non-persistent PLEs, n^b=number with persistent PLEs

Abbreviations: CES-D = Center for Epidemiologic Studies Depression Scale MAFS = Multidimensional Adolescent Functioning Scale, GHQ= General Health Questionnaire, YRBS= Youth Risk Behaviour Survey, RSE= Rosenberg Self-Esteem Inventory, PLE= Psychotic-like Experience

[†]Logged

TABLE 4: Binary Logistic Regression of predictor variables at baseline and associations at follow up with Persistence of Psychotic-like Experience (PLEs)

	Baseline	Follow-Up
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	UOR (95%CI) [<i>p</i>]	AOR (95% CI) [<i>p</i>]	UOR (95%CI) [<i>p</i>]	AOR (95%CI) [<i>p</i>]
Depression <i>CES-D</i>	1.11 (1.08-1.15) [$<.001$]	1.11(1.03-1.18) [.003]	1.11 (1.07-1.14) [$<.001$]	1.09 (1.02-1.16) [.010]
Functioning <i>MAFS</i>	0.93 (0.90-0.96) [$<.001$]	1.00(0.95-1.06) [.981]	0.92 (0.88-0.95) [$<.001$]	0.10 (0.05-1.82) [.120]
Psychological Distress <i>GHQ</i>	1.14 (1.08-1.19) [$<.001$]	0.97(0.88-1.07) [.503]	1.14 (1.09-1.20) [$<.001$]	0.99 (0.91-1.09) [.973]
Personality <i>NEO-FFI</i>				
-Agreeableness	0.87 (0.81-0.93) [$<.001$]	0.94(0.86-1.03) [.171]		
-Openness	1.08 (1.02-1.15) [.009]	1.04(0.97-1.12) [.231]		
-Neuroticism	1.15 (1.09-1.20) [$<.001$]	1.03(0.96-1.10) [.384]		
Suicidality <i>YRBS</i>			1.71 (1.35-2.17) [$<.001$]	0.92 (0.68-1.26) [.615]
Self-esteem <i>RSE</i> [†]			0.01 (0.002-0.05) [.009]	0.48 (0.02-9.61) [.629]
Follow-up Time (Days)	0.997 (0.995-1.00) [.036]	0.998 (0.994-1.00) [.137]	0.997 (.995-1.00) [.036]	0.998 (0.995-1.00) [.214]

Note: CI= Confidence Interval, UOR= Unadjusted Odds ratio AOR: Adjusted odds ratio

Abbreviations: CES-D = Center for Epidemiologic Studies Depression Scale MAFS = Multidimensional Adolescent Functioning Scale, GHQ= General Health Questionnaire, NEO-FFI=Neuroticism-Extraversion-Openness Five-Factor Inventory, YRBS= Youth Risk Behaviour Survey, RSE=Rosenberg Self-Esteem Inventory, PLE= Psychotic-like experience

† Logged

Figure Legends

FIGURE 1: Patient Flow Diagram

FIGURE 2: (a) Bi-directional association between depression and Psychotic-Like experiences (PLEs),(b) Common underlying factor associated with depression and Psychotic-Like experiences (PLEs)

Figure 2a: Bi-directional association between depression and Psychotic-Like experiences (PLEs)

Figure 2b: Common underlying factor associated with depression and Psychotic-Like experiences (PLEs)

Figure 1: Patient Flow Chart

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