

**Prevalence and Correlates of Psychotic Like Experiences in a Nationally
Representative Community Sample of Adolescents in Ireland**

Author:

Dr. Louise Dolphin^a

^aSchool of Psychology, Newman Building, University College Dublin, Belfield, Dublin 4,
Ireland.

Email: louise.dolphin@ucd.ie

Corresponding Author:

Dr. Barbara Dooley^a

^aSchool of Psychology, Newman Building, University College Dublin, Belfield, Dublin 4,
Ireland.

Email: barbara.dooley@ucd.ie Ph: 00 353 1 716 8725 Fax 00 353 1 716 1181

Author:

Dr. Amanda Fitzgerald^a

^aSchool of Psychology, Newman Building, University College Dublin, Belfield, Dublin 4,
Ireland.

Email: amanda.fitzgerald@ucd.ie

Abstract

Adolescent Psychotic Like Experiences (PLEs) are an important area of research, yet only a small number of community surveys have investigated their psychosocial correlates. This study presents the prevalence and correlates of three types of PLEs in a nationally representative community sample of 12-19 year olds in Ireland ($N = 5,910$). Correlates are considered across five domains: demographic, stressful life experiences, emotional/behavioral problems, substance use, and personal resources. Auditory hallucinations were reported by 13.7% of participants, 10.4% reported visual hallucinations and 13.1% reported paranoid thoughts. Participants who had experienced two of the three PLEs were assigned "risk" status (10.4%; $n = 616$). Using binary logistic regression, PLEs were associated with a range of correlates across the five domains. Key correlates of risk status include depression (OR 4.07; 95% CI 3.39-4.88), low self-esteem (OR 4.03 95% CI 3.34-4.86), low optimism (OR 3.56; 95% CI 2.96-4.28), school misconduct (OR 3.10 95%; CI 2.56-3.75), and high avoidance coping (OR 2.86 95% CI 2.34-3.49). These associations remained significant in a multivariate analysis. While correlates for each of the three PLEs were similar, there were some nuances in these patterns. Notably, demographic and substance use variables were the weakest groups of correlates. Personal resources (e.g. self-esteem, optimism and coping) have been poorly studied in the adolescent PLE literature and these findings provide important insights for future research and intervention design.

Keywords: *adolescent psychotic like experiences; auditory hallucinations; visual hallucinations; paranoid thought; psychosocial correlates*

1. Introduction

Psychotic like experiences (PLEs) are psychotic symptoms reported by members of the general population in the absence of illness i.e. a non-clinical psychosis phenotype (Kelleher & Cannon, 2011). The reported prevalence of PLEs among adolescents is 7.5% (Kelleher et al., 2012b). A focus on this non-clinical psychosis population is important for several reasons. Firstly, a clinical continuum between PLEs and psychotic disorder has been demonstrated. Poulton et al. (2000) found that 11 year olds reporting psychotic symptoms during diagnostic interview were 16-times more likely to receive a psychotic illness diagnosis at age 26. In terms of specific PLEs, adolescent self-reported auditory hallucinations at age 14 are associated with a two- to five-times (females/males respectively) greater risk of non-affective psychoses at age 21 (Welham et al. 2009). Thus, adolescents experiencing PLEs can be considered at symptomatic increased risk for psychotic disorder. However, methodological limitations of the aforementioned studies regarding specificity of PLEs for later adult psychiatric disorder have been highlighted, and non-psychotic outcomes are also common (Fisher et al., 2013).

Researchers have suggested that it may no longer be useful to extrapolate findings regarding early PLEs solely to psychotic disorders, but rather consider PLEs in youth as early markers for poor mental health more generally in adulthood (Fisher et al., 2013). PLEs are associated with a wide variety of non-psychotic psychopathology and they mark out risk for severe psychopathology and multi-morbidity (Kelleher & Cannon, 2012; Kelleher et al., 2012b). The majority of adolescents who experience PLEs also report the experiences as distressing (Kelleher et al., 2015), and interventions to reduce such distress are needed.

Despite the recognition that adolescent PLEs are an important area of research, only a small number of community surveys have investigated their correlates. Many adolescents who experience PLEs report the experiences as distressing (Kelleher et al., 2015), and the development of interventions to reduce such distress is necessary. Thus a comprehensive understanding of the correlates of adolescent PLEs is important.

Regarding demographic factors, younger adolescents report a higher prevalence of psychotic symptoms than older adolescents (Kelleher et al., 2012). Certain studies report a higher prevalence of psychotic symptoms among male adolescents (Kelleher et al., 2008; Kelleher et al., 2012), but other studies report no gender differences (Scott et al., 2009). Additional demographic correlates include ethnic background (Laurens et al., 2012; Tolmac & Hodes, 2004) and blended or sole parent families (Scott et al., 2009). Family history of mental illness is one of the strongest risk factors for psychotic experiences in general population studies (Linscott & van Os, 2013), but this link requires clarification with adolescents. Known familial demographic factors associated with adolescent psychopathology including mother's education and father's employment (Bacikova-Sleskova, Benka, & Orosova, 2014; Dooley, Fitzgerald, & Mac Giollabhui, 2015) also require investigation in the context of PLEs. In terms of stressful life events, PLEs are associated with experiences of bullying victimization (Campbell and Morrison, 2007; Lataster et al., 2006; Mackie et al., 2011) and perceived racism in adult samples (Karlsen et al., 2005; Veling, Hoek, & Mackenbach, 2008). Other stressful life events commonly experienced by adolescents (e.g. bereavement) have been overlooked.

PLEs are associated with anxiety and depression (Armando et al., 2010; Mackie et al., 2011; Scott et al., 2006; Scott et al., 2009), externalizing behaviors (Downs et al., 2013) and both interpersonal violence and violence towards objects (Kinoshita et al., 2011). PLEs are also linked to substance use (Mackie et al., 2011), most notably adolescent cannabis use - both lifetime and recent (Henquet et al., 2005; Hides et al., 2009; Scott et al., 2009). Findings regarding alcohol use and adolescent PLEs are inconclusive (Scott et al., 2009; van Os et al., 2009).

While further clarification is needed regarding many of above risk factors for adolescent PLEs, researchers have stressed the importance of examining an individual's strengths and resources, which can mitigate the likelihood of PLEs transitioning to psychotic disorder (Oh et al., 2014). Some studies indicate that emotional focused coping is associated with persistence of PLEs (Lin et al., 2011) and other studies report avoidant

coping associations (Wigman et al., 2014). However, on balance, there is a dearth of literature considering personal resources including self-esteem, optimism, coping and personal competence, and whether they are significant correlates of adolescent PLEs.

Regarding types of PLEs, this study will examine correlates of auditory hallucinations, visual hallucinations and paranoid thoughts, due to their established predictive power for PLEs in adolescent samples (Kelleher et al., 2011). Of note, the assessment of auditory hallucinations has good predictive value not just for auditory hallucinations but for psychotic symptoms in general (Kelleher et al., 2011).

This study aims to advance knowledge in three ways. First, no study to date has examined such a range of factors from these five domains (demographic, stressful life experiences, emotional/behavioral problems, substance use, and personal resources) to establish correlates of adolescent PLEs. Second, this study considers variables pertaining to personal resources (self-esteem, optimism, competence, and coping) associated with other aspects of adolescent mental health, but largely overlooked in the adolescent PLE literature. Finally, previous research often only investigates predictors of a single PLE (e.g. hallucinations; Scott et al., 2009). However, theorists have called for the identification of relationships between different specific symptoms and predictor variables (Garety et al., 2007). This is particularly important in the case of adolescent PLEs where specific psychotic experiences appear to be quite distinct (Ronald et al., 2014).

2. Methods

2.1. Participants

Participants were drawn from a nationally representative post-primary sample of 6,062 adolescents aged 12-19 years ($M= 14.95$; $SD = 1.62$) who participated in the My World Survey- Second Level (MWS-SL), a cross-sectional community survey of risk and protective factors of mental health (Dooley & Fitzgerald, 2012). The school sampling framework was developed to reflect the national distribution of schools characterized as: disadvantaged and non-disadvantaged; the distribution of school gender composition (single-sex boys, single-sex girls, mixed gender); the distribution of schools in each Irish healthcare district and to include at least one school from every county in the Republic of Ireland. A sample of 6,062 second-level students from 72 schools aged 12-19 years ($M=14.94$, $SD=1.63$) participated in the survey and 51% of the sample was female. Informed consent was obtained from all participants and their parents/guardians, with a participant response rate of 45%. Additional information regarding the procedures employed by the MWS-SL study including details on ethics, recruitment, and standardized protocol for survey administration in schools is available in a previously published article (Dooley & Fitzgerald, 2013).

2.2. Measurement of PLEs

Three questions regarding auditory hallucinations ("Have you ever heard voices or sounds that no one else can hear?"), visual hallucinations ("Have you ever seen things that other people could not see?"), and paranoid thoughts ("Have you ever thought that people are following or spying on you?") were chosen from the Adolescent Psychotic-Like Symptom Screener (APSS) due to their reported predictive power for PLEs in the general population (Kelleher et al., 2011). Possible responses included "Yes, definitely", "Maybe", and "No". PLEs were dichotomized as either present or not present; "Yes, definitely" was scored as 1, and "Maybe" and "No" were scored as 0. An a priori decision was made to assign "risk" status to those who had answered "Yes, definitely" to two of the three PLE questions, based

on previous research regarding the predictive validity of two screening questions to predict PLEs in a diagnostic interview (Kelleher et al., 2011).

2.4 Demographic measures

All demographic questions were one item questions. Second Level School Cycle was dichotomized into Junior Cycle (Years 1 to 3) versus Senior Cycle (Years 4 to 6); Gender into male/female.; Ethnicity into "White" versus "Black", "Asian", "Irish Traveller" or "Other"; Intact parents into "parents married" or "living together but not married" versus other responses. Responses to "Has your mother or father ever had a mental health problem (for example, depression, alcohol, or drug addiction)" were dichotomized into "Yes" versus "No" and "Don't know"; Maternal Education into "Junior Certificate" (lowest level of education listed) versus other responses, and Paternal Employment into "Employed full-time/part-time" versus other responses.

2.5 Stressful life experience measures

Participants responded "Yes" or "No" to the following questions: "Have you been bullied?", "Have you ever been treated unfairly because of your race or ethnic group?", and "Has anyone close to you died in the last 12 months?".

2.6 Emotional/Behavioral problem measures

The depression subscale of the Depression, Anxiety and Stress Scale (DASS-21) was employed to ascertain whether participants had experienced depression. Using recommended cut-off scores (Lovibond & Lovibond 1995), responses were dichotomized into normal or mild, versus moderate, severe or very severe depression. Participants were asked "Do you feel angry a lot" and responses were dichotomized into "No" versus "Yes" or "Sometimes". School misconduct was assessed using 7 school-related items from the Behavioral Adjustment Scale (BAS; Brown, Clasen, & Eicher, 1986) (e.g. cheated on an exam, talked back to teachers) and scores were dichotomized one standard deviation above the mean.

2.7 Substance use measures

Lifetime use of cannabis was assessed with "Have you ever smoked cannabis?" to which participants responded "Yes" or "No". Cannabis recency (use over the past 30 days) was assessed with an item from the BAS. Responses were dichotomized as "never" versus other. Risky alcohol behavior was measured using a cutoff score of ≥ 5 on the total AUDIT (Alcohol Use Disorder Identification Test; Saunders et al., 1993) score, where a cutoff below 5 indicated low risk alcohol use while a score at 5 or above indicated risky alcohol behaviour (Santis et al., 2009). The CRAFFT Substance Use Screening Tool was employed to assess substance use and dependence (Knight et al., 1999). Scores were dichotomized at a recommended cut-off score of 2 (Knight et al., 2002).

2.8 Personal resource measures

Self-esteem was measured using the Rosenberg Self-Esteem scale (Rosenberg, 1965), optimism with the Life Orientation Test- Revised (Scheier, Carver & Bridges, 1994) , personal competence with a subscale of the Resilience Scale for Adolescents (READ; Hjemdal et al., 2006), and coping (problem solving, seeking social support and avoidance) with the Coping Strategy Indicator (Amirkhan, 1990). In the absence of official cut-off scores, these variables were dichotomized one standard deviation below the mean. Avoidance coping was dichotomized one standard deviation above the mean, indicating risk.

2.9. Analysis plan

Analyses were performed using SPSS version 20 (IBM Corp., 2011). Associations between PLEs and predictors were examined using univariate logistic regression, reported as unadjusted odds ratios. A second multivariate logistic regression analysis was also conducted, including all predictor variables in the model, to ascertain the relationships between PLEs and specific predictors, while controlling for potential confounding factors.

3. Results

3.1. Treatment of missing data

Of the total MWS post-primary school sample ($N= 6,062$), 152 participants were missing data on one or more APSS item(s) and thus were excluded from further analysis leaving a sample of 5,910. Missing data analysis revealed that 3.53% of data were missing. However, 40% of participants were missing at least one value on a predictor variable, therefore multiple imputation was conducted.

3.2. Prevalence of PLEs

Of the 5,910 adolescents, 881 (13.7%) reported auditory hallucinations, 616 (10.4%) reported visual hallucinations, and 775 (13.1%) reported paranoid thoughts. Subsequently, 616 (10.4%) participants were assigned "risk" status (see Section 2.2) for reporting two of the three PLEs. Of note, 212 participants (3.6%) reported all three PLEs.

3.3. Frequency analysis

Frequencies for predictor variables are presented in Table 1 below. A Spearman's correlation matrix including all predictor variables is available in Appendix A.

INSERT TABLE 1

3.4. Demographic and stressful life experiences correlates of PLEs

As evidenced in Table 2, the strongest demographic correlates of risk status in the univariate analysis were reported parent mental health problem and non-intact parents, however, these relationships were not significant in the multivariate model. Significant predictors in the multivariate models included age and gender for both auditory and visual hallucinations, and age for paranoid thoughts and risk status.

Regarding stressful life events (see Table 2), experience of racism, bullying, or a bereavement was associated with an increased likelihood of reporting all PLEs, and of risk status classification. These relationships remained significant in the multivariate analysis.

INSERT TABLE 2

3.5. PLEs and emotional/behavioral, substance use, and personal resource correlates

All emotional/behavioral problem variables (see Table 3) were significantly associated with PLEs and risk status, both in the univariate and multivariate analyses. The strongest association with risk status was depression, followed by school misconduct and feeling angry, in both sets of analyses.

For substance use variables (see Table 3), all relationships reached significance in the univariate analysis but not in the multivariate analysis, indicating confounding with other predictor variables. The only significant relationship in the multivariate analysis was between auditory hallucinations and smoking cannabis in the last 30 days.

All personal resource variables were significantly associated with individual PLEs and risk status in the univariate analysis. In the multivariate analysis significant associations include low optimism and high avoidance coping for auditory hallucinations, low self-esteem and high avoidance coping for visual hallucinations and paranoid thoughts, and low optimism, low self-esteem, and high avoidance coping for risk status.

INSERT TABLE 3

In the multivariate regression models, R squared values ranged from .148 to .191 indicating that the models explained between 14.8% and 19.1% of variance.

4. Discussion

This large, community-based, nationally representative survey of adolescent Psychotic Like Experiences (PLEs) provides numerous important insights. Regarding prevalence, 13.7% of adolescents report auditory hallucinations, 10.4% report visual hallucinations, and 13.1% report paranoid thoughts. These prevalence rates are elevated compared to previous research (Kelleher et al., 2012b; Scott et al., 2009). Participants who reported two of these PLEs were assigned "risk" status (10.4%).

The key domain of interest in this study is personal resources as these factors have been largely overlooked in the adolescent PLE literature. Our findings confirm their importance for investigation. All personal resource variables were significant in the univariate analysis, with low optimism, low self-esteem, and high avoidance coping remaining significant predictors of risk status in the multivariate model. The avoidance coping link has been previously highlighted (Wigman et al., 2014), but other associations are novel in this field of research and add to the growing body of literature examining resilience and strengths in tandem with psychopathology (Oh et al., 2014).

Younger adolescents were more likely to report PLEs, as previously reported (Kelleher et al., 2012). However, it should be noted that female gender predicted auditory and visual hallucinations in the multivariate models; an unusual finding compared with adolescent (Kelleher et al., 2008) and adult research (John et al., 2004). Building on previous research (Bacikova-Sleskova et al., 2014; Dooley et al., 2015; Laurens et al., 2012; Tolmac & Hodes, 2004), ethnicity, non-intact parents, parent mental health problem, low mother's education and father unemployment were significantly associated with all types of PLEs in the univariate analysis, but these associations were not significant in the multivariate models. When compared to other domains, demographic factors were poor predictors of PLEs. On the other hand, stressful life events (experience of bullying, racism, or bereavement) were significant predictors of all PLEs and of risk status. Our findings also suggest the importance of including experience of bereavement as a correlate of PLEs as no study has considered it before.

Corresponding to previous research (Scott et al., 2009), adolescents who experienced depression were more likely to report each PLE and receive risk status than those who had not experienced depression. Adolescents who reported school misconduct and feelings of anger, indicative of externalizing behaviors, were also more likely to report all PLEs. As with demographic predictors, substance use variables were significantly associated with PLEs in the univariate analysis but these relationships were not significant in the multivariate analysis. Only one association -auditory hallucinations and recent (30 day) cannabis use - remained significant in the multivariate analysis, a finding analogous to previous research (Mackie et al., 2010). This lack of association between substance use variables and PLEs in multivariate models is interesting given the emphasis on this link in previous studies (Henquet et al., 2005; Hides et al., 2009; Mackie et al., 2011; Scott et al., 2009).

Effective identification and intervention efforts can potentially ameliorate the distress associated with adolescent PLEs (Kelleher et al., 2015). While causation cannot be inferred with this cross-sectional data and the causal pathways between PLEs and associated correlates are currently unclear (Ames et al., 2013), interventions that target modifiable PLE correlates such as self-esteem, optimism, personal competence and avoidant coping could possibly reduce the distress associated with adolescent PLEs (Kelleher et al., 2015). Subsequently, psychological intervention that reduces current distress and improves coping and functioning may increase resilience to future development of PLEs (Ames et al., 2013).

Alongside the cross-sectional nature of this study, several additional limitations should be noted. The high prevalence of PLEs in this study compared to previous research could be due to measurement. While Kelleher et al. (2011) note accurate identification of adolescents who have experienced PLEs is possible using a rapidly administered, self-report questionnaire, other researchers suggest that using self-report methods to identify PLEs in the community results in either under-reporting due to social desirability bias (DeVylder & Hilimire, 2014), or over-reporting due to misinterpretation of the question (Scott et al., 2009). Additionally, findings regarding cannabis should be interpreted with caution: for adolescents

at high risk for psychosis, self-reported cannabis use is inconsistent with results from drug screening, with some youths exaggerating cannabis usage (Carol & Mittal, 2014). Finally, certain variables associated with adolescent PLEs were not measured in this study e.g. childhood trauma (Kelleher et al., 2008) and risk for suicide attempts (Kelleher et al., 2013; Martin et al., 2014).

This is the first ever large, community-based study to consider such a range of PLE correlates. Most notably, personal resources such as self-esteem, optimism, personal competence, and coping have been poorly researched in this literature but are important correlates of adolescent PLEs and should be considered when designing interventions with this group. While many adolescents who report PLEs in this study will not go on to develop psychosis (Poulton et al., 2000; Welham et al. 2009), and there is a need to differentiate innocuous PLEs from potentially pathological attenuated symptoms (Kline et al., 2014), our findings indicate that adolescents who report PLEs are likely to present with a particular profile including demographic variables, stressful life experiences, behavioral/emotional problems, substance use, and low personal resources.

References

- Amirkhan, J. H. 1990. A factor analytically derived measure of coping: the coping strategy indicator. *J Pers Soc Psychol* 59, 1066–74.
- Armando, M., Nelson, B., Yung, A.R., Ross, M., Birchwood, M., Girardi, P., Fiori Nastro, P., 2010. Psychotic-like experiences and correlation with distress and depressive symptoms in a community sample of adolescents and young adults. *Schizophr Res* 119, 258-265.
- Bacikova-Sleskova, M., Benka, J., Orosova, O., 2014. Parental employment status and adolescents' health: The role of financial situation, parent-adolescent relationship and adolescents' resilience. *Psychology & Health* 30(4), 1-23.
- Brown, B. B., Clasen, D. R., Eicher, S. A. 1986. Perceptions of peer pressure, peer conformity dispositions, and self-reported behavior among adolescents. *Dev. Psychol.* 22, 521-530.
- Campbell, M.L.C., Morrison, A.P., 2007. The relationship between bullying, psychotic-like experiences and appraisals in 14–16-year olds. *Behav Res Ther* 45(7), 1579-1591.
- Carol, E.E., Mittal, V.A., 2014. Self-reported cannabis use is inconsistent with the results from drug-screening in youth at ultra high-risk for psychosis in Colorado. *Schizophr Res* 157, 317-318.
- DeVylder, J.E., Hilimire, M.R., 2014. Screening for psychotic experiences: social desirability biases in a non-clinical sample. *Early Interv Psychiatry*.
- Dooley, B., Fitzgerald, A., 2012. My World Survey: National study of youth mental health in Ireland. Headstrong and UCD School of Psychology, Dublin, Ireland.
- Dooley, B., Fitzgerald, A. 2013. Methodology on the My World Survey (MWS): a unique window into the world of adolescents in Ireland. *Early Interv Psychiatry* 7, 12-22.
- Dooley, B., Fitzgerald, A., Mac Giollabhui, N. 2015. The risk and protective factors associated with depression and anxiety in a national sample of Irish adolescents. *Ir J Psychol Med* 32, 93-105.
- Downs, J.M., Cullen, A.E., Barragan, M., Laurens, K.R., 2013. Persisting psychotic-like experiences are associated with both externalising and internalising psychopathology in a longitudinal general population child cohort. *Schizophr Res* 144(1-3), 99-104.
- Fisher, H. L., Caspi, A., Poulton, R., Meier, M. H., Houts, R., Harrington, H., Arseneault, L. & Moffitt, T. E. (2013). Specificity of childhood psychotic symptoms for predicting schizophrenia by 38 years of age: a birth cohort study. *Psychol Med* 43(10), 2077-2086.

- Garety, P.A., Bebbington, P., Fowler, D., Freeman, D., Kuipers, E., 2007. Implications for neurobiological research of cognitive models of psychosis: a theoretical paper. *Psychol Med* 37(10), 1377-1391.
- Henquet, C., Krabbendam, L., Spauwen, J., Kaplan, C., Lieb, R., Wittchen, H.-U., van Os, J., 2005. Prospective cohort study of cannabis use, predisposition for psychosis, and psychotic symptoms in young people. *BMJ* 330(7481), 11-11.
- Hides, L., Lubman, D.I., Buckby, J., Yuen, H.P., Cosgrave, E., Baker, K., Yung, A.R., 2009. The association between early cannabis use and psychotic-like experiences in a community adolescent sample. *Schizophr Res* 112, 130-135.
- Hjemdal, O., Friborg, O., Stiles, T. C., Martinussen, M., Rosenvinge, J. H. 2006. A new rating scale for adolescent resilience: grasping the central protective resources behind healthy development. *Meas Eval Couns Dev.* 39, 84–96.
- IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.
- Johns, L.C., Cannon, M., Singleton, N., Murray, R.M., Farrell, M., Brugha, T., Bebbington, P., Jenkins, R., Meltzer, H., 2004. Prevalence and correlates of self-reported psychotic symptoms in the British population. [Br J Psychiatry](#) 185(4), 298-305.
- Karlsen, S., Nazroo, J. Y., McKenzie, K., Bhui, K., Weich, S. (2005). Racism, psychosis and common mental disorder among ethnic minority groups in England. *Psychol Med* 35(12), 1795-1803.
- Kelleher, I., Cannon, M., 2011. Psychotic-like experiences in the general population: characterizing a high-risk group for psychosis. *Psychol Med* 41(1), 1-6.
- Kelleher, I., Cannon, M., 2012. The authors reply: All that shines is not psychosis ... but is still clinically important. *Psychol Med* 42(08), 1788-1790.
- Kelleher, I., Connor, D., Clarke, M., Devlin, N., Harley, M., Cannon, M., 2012a. Prevalence of psychotic symptoms in childhood and adolescence: a systematic review and meta-analysis of population-based studies. *Psychol Med* 1(1), 1 -7.
- Kelleher, I., Connor, D., Clarke, M.C., Devlin, N., Harley, M., Cannon, M., 2012b. Prevalence of psychotic symptoms in childhood and adolescence: a systematic review and meta-analysis of population-based studies. *Psychol Med* 42, 1857-1863.
- Kelleher, I., Corcoran, P., Keeley, H., Wigman, J.T., Devlin, N., Ramsay, H., Wasserman, C., Carli, V., Sarchiapone, M., Hoven, C., Wasserman, D., Cannon, M., 2013. Psychotic symptoms and population risk for suicide attempt: a prospective cohort study. *JAMA Psych* 70(9), 940-948.
- Kelleher, I., Harley, M., Murtagh, A., Cannon, M., 2011. Are Screening Instruments Valid for Psychotic-Like Experiences? A Validation Study of Screening Questions for

- Psychotic-Like Experiences Using In-Depth Clinical Interview. *Schizophr Bull* 37(2), 362-369.
- Kelleher, I., Harley, M., Lynch, F., Arseneault, L., Fitzpatrick, C., Cannon, M., 2008. Associations between childhood trauma, bullying and psychotic symptoms among a school-based adolescent sample. *Br J Psychiatry* 193(5), 378-382.
- Kelleher, I., Wigman, J.T.W., Harley, M., O'Hanlon, E., Coughlan, H., Rawdon, C., Murphy, J., Power, E., Higgins, N.M., Cannon, M., 2015. Psychotic experiences in the population: Association with functioning and mental distress. *Schizophr Res* 165(1), 9-14.
- Kinoshita, Y., Shimodera, S., Nishida, A., Kinoshita, K., Watanabe, N., Oshima, N., Akechi, T., Sasaki, T., Inoue, S., Furukawa, T.A., Okazaki, Y., 2011. Psychotic-like experiences are associated with violent behavior in adolescents. *Schizophr Res* 126(1-3), 245-251.
- Kline, E., Thompson, E., Bussell, K., Pitts, S.C., Reeves, G., Schiffman, J., 2014. Psychosis-like experiences and distress among adolescents using mental health services. *Schizophr Res* 152(2-3), 498-502.
- Knight, J. R., Shrier, L., Bravender, T., Farrell, M., Vander Bilt, J., Shaffer, H. 1999. A new brief screen for adolescent substance abuse. *Arch Pediatr Adolesc Med.* 153, 591-6.
- Knight, J. R., Sherritt, L., Shrier, L. A., Harris, S. K., Chang, G. 2002. Validity of the CRAFFT substance abuse screening test among adolescent clinic patients. *Arch Pediatr Adolesc.* 156, 607-14.
- Lataster, T., van Os, J., Drukker, M., Henquet, C., Feron, F., Gunther, N., Myin-Germeys, I., 2006. Childhood victimisation and developmental expression of non-clinical delusional ideation and hallucinatory experiences. *Soc Psychiat Epidemiol* 41(6), 423-428.
- Laurens, K.R., Hobbs, M.J., Sunderland, M., Green, M.J., Mould, G.L., 2012. Psychotic-like experiences in a community sample of 8000 children aged 9 to 11 years: an item response theory analysis. *Psychol Med* 42(7), 1495-1506.
- Lin, A., Wigman, J.T., Nelson, B., Vollebergh, W.A., van Os, J., Baksheev, G., Ryan, J., Raaijmakers, Q.A., Thompson, A., Yung, A.R., 2011. The relationship between coping and subclinical psychotic experiences in adolescents from the general population--a longitudinal study. *Psychol Med* 41(12), 2535-2546.
- Linscott, R.J., van Os, J., 2013. An updated and conservative systematic review and meta-analysis of epidemiological evidence on psychotic experiences in children and adults: on the pathway from proneness to persistence to dimensional expression across mental disorders. *Psychol Med* 43(6), 1133-1149.

- Lovibond, S. H, Lovibond, P. F. 1995. Manual for the Depression Anxiety Stress Scales, 2nd edn. Sydney: Psychology Foundation.
- Mackie, C.J., Castellanos-Ryan, N., Conrod, P.J., 2011. Developmental trajectories of psychotic-like experiences across adolescence: impact of victimization and substance use. *Psychol Med* 41(01), 47-58.
- Martin, G., Thomas, H., Andrews, T., Hasking, P., Scott, J.G., 2014. Psychotic experiences and psychological distress predict contemporaneous and future non-suicidal self-injury and suicide attempts in a sample of Australian school-based adolescents. *Psychol Med*, 1-9.
- Oh, H., DeVlyder, J.E., Chen, F.p., 2014. To Treat or Not to Treat: Responding to Psychotic Experiences. *Brit J Soc Work*.
- Poulton, R., Caspi, A., Moffitt, T.E., Cannon, M., Murray, R., Harrington, H., 2000. Children's self-reported psychotic symptoms and adult schizophreniform disorder: A 15-year longitudinal study. *Arch. Gen. Psychiatry* 57(11), 1053-1058.
- Ronald, A., Sieradzka, D., Cardno, A.G., Haworth, C.M., McGuire, P., Freeman, D., 2014. Characterization of psychotic experiences in adolescence using the specific psychotic experiences questionnaire: findings from a study of 5000 16-year-old twins. *Schizophr Bull* 40(4), 868-877.
- Rosenberg, M. 1965. *Society and the Adolescent Self-Image*. Princeton, NJ: Princeton University Press.
- Santis, R., Garmendia, M.L., Acuna, G., Alvarado, M.E, Arteaga, O. 2009. The Alcohol Use Disorders Identification Test (AUDIT) as a screening instrument for adolescents. *Drug Alcohol Depend.* 103, 155-158.
- Saunders, J. B, Aasland, O. G, Babor, T.F, de la Fuente, J. R, Grant, M. 1993. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption: II. *Addiction* 88, 791–804.
- Scheier, M. F., Carver, C. S., Bridges, M. W. 1994. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): a reevaluation of the Life Orientation Test. *J Pers Soc Psychol.* 67(6), 1063.
- Scott, J., Chant, D., Andrews, G., McGrath, J., 2006. Psychotic-like experiences in the general community: the correlates of CIDI psychosis screen items in an Australian sample. *Psychol Med* 36(2), 231-238.
- Scott, J., Martin, G., Bor, W., Sawyer, M., Clark, J., McGrath, J., 2009. The prevalence and correlates of hallucinations in Australian adolescents: Results from a national survey. *Schizophr Res* 107(2–3), 179-185.

- Tolmac, J., Hodes, M. 2004. Ethnic variation among adolescent psychiatric in-patients with psychotic disorders. *Br J Psychiatry* 184(5), 428-431.
- Van Os, J., Linscott, R. J., Myin-Germeys, I., Delespaul, P., Krabbendam, L. 2009. A systematic review and meta-analysis of the psychosis continuum: evidence for a psychosis proneness–persistence–impairment model of psychotic disorder. *Psychol Med* 39(02), 179-195.
- Veling, W., Hoek, H. W., Mackenbach, J. P. 2008. Perceived discrimination and the risk of schizophrenia in ethnic minorities. *Soc Psychiatry Psychiatr Epidemiol* 43(12), 953-959.
- Welham, J., Scott, J., Williams, G., Najman, J., Bor, W., O'Callaghan, M., McGrath, J. 2009. Emotional and behavioural antecedents of young adults who screen positive for non-affective psychosis : a 21-year birth cohort study. *Psychol Med* 39, 625–634.
- Wigman, J., Devlin, N., Kelleher, I., Murtagh, A., Harley, M., Kehoe, A., Fitzpatrick, C., Cannon, M., 2014. Psychotic symptoms, functioning and coping in adolescents with mental illness. *BMC Psychiatry* 14(1), 97.

Appendix A

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	School Cycle (Junior Cycle)	1																						
2	Female Gender	-.045**	1																					
3	Ethnicity (Not White)	.009	.004	1																				
4	Parents Not Intact	-.028*	.043*	.051**	1																			
5	Parent Mental Problem	-.093**	.077**	.018	.259**	1																		
6	Low Mother's Education	-.101**	.061**	-.018	.051**	.074**	1																	
7	Father Unemployed	-.015	.016	.053**	.077**	.133**	.050**	1																
8	Experienced Bullying	-.019	.078**	.010	.071**	.095**	.023	.038**	1															
9	Experienced Racism	.069**	-.074**	.237**	.051**	.063**	-.005	.038**	.142**	1														
10	Experienced Bereavement	.036**	.025	.008	.032*	.040**	.037**	.031*	.044**	.044**	1													
11	Experienced Depression	-.085**	.098**	.047**	.072**	.148**	.048**	.071**	.203**	.114**	.074**	1												
12	Feel Angry	-.043**	-.004	.021	.069**	.111**	.042**	.050**	.179**	.085**	.077**	.271**	1											
13	School Misconduct	-.004	-.080**	.034**	.088**	.113**	.050**	.069**	.036**	.120**	.076**	.178**	.148**	1										
14	Cannabis Use/Lifetime	-.224**	-.107**	.043**	.107**	.130**	.058**	.036**	.024	.095**	.025	.129**	.137**	.221**	1									
15	Cannabis 30 Days	-.128**	-.082**	.050**	.090**	.113**	.050**	.050**	.013	.090**	.043**	.140**	.127**	.284**	.636**	1								
16	Risky Alcohol Use	-.401**	-.034**	-.001	.098**	.147**	.086**	.054**	.009	.045**	.060**	.159**	.137**	.298**	.422**	.353**	1							
17	Substance Use/Dependence	-.238**	-.024	.027*	.084**	.163**	.066**	.058**	.056**	.082**	.096**	.212**	.179**	.340**	.443**	.409**	.556**	1						
18	Low Self-Esteem	-.070**	.178**	.018	.052**	.150**	.065**	.049**	.168**	.065**	.058**	.459**	.226**	.129**	.082**	.093**	.117**	.164**	1					
19	Low Optimism	-.091**	.145**	-.004	.069**	.148**	.063**	.085**	.151**	.057**	.069**	.391**	.243**	.155**	.110**	.113**	.153**	.190**	.504**	1				
20	Low Personal Competence	-.087**	.164**	-.004	.070**	.140**	.052**	.058**	.116**	.028	.040**	.348**	.198**	.120**	.088**	.071**	.125**	.164**	.461**	.427**	1			
21	Low Seeking Support Coping	.034*	-.184**	.015	.015	.016	-.002	.015	.008	.055**	-.008	.077**	.083**	.046**	.023	.018	-.020	.010	.073**	.075**	.094**	1		
22	Low Problem Solving Coping	.001	.044**	-.017	.043**	.063**	.024	.054**	.034**	.016	.041**	.133**	.094**	.116**	.041**	.034*	.067**	.079**	.205**	.192**	.240**	.278**	1	
23	High Avoidance Coping	-.040**	.103**	.045**	.044**	.101**	.036**	.032*	.135**	.086**	.043**	.336**	.179**	.114**	.061**	.075**	.096**	.14**	.256*	.214**	.192**	.029	.061**	1

Table A. Correlations between predictor variables

Note. * $p < .05$. ** $p < .01$. *** $p < .001$

Table 1. Frequency analysis for predictor variables

Variable	%	Variable	%
School Cycle (Junior)	58.4	School Misconduct	15.0
Female Gender	51.7	Cannabis Lifetime	11.8
Non-intact Parents	18.8	Cannabis Recency	8.2
Parent Mental Health Problem	11.9	Risky Alcohol Behavior	31.4
Low Maternal Education	10.5	Substance Use and Dependence	15.7
Father Unemployed	16.1	Low Self-Esteem	14.1
Ethnicity (Not White)	3.5	Low Optimism	18.2
Experienced Bullying	42.4	Low Personal Competence	13.9
Experienced Racism	10.2	Low Problem Solving Coping	14.8
Experienced Bereavement	28.1	Low Seeking Support Coping	17.7
Experienced Depression	19.9	High Avoidance Coping	15.9
Feel Angry	54.0		

Table 2. Demographic and Stressful Life Experience Correlates of Psychotic Like Experiences (PLEs) and Risk Status

	Auditory Hallucinations				Visual Hallucinations				Paranoid Thoughts				Risk Status			
	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)		
Demographic																
School Cycle (Junior Cycle)	1.53*** (1.31-1.79)	1.46*** (1.19-1.80)	1.48*** (1.24-1.76)	1.86*** (1.51-2.29)	1.13 (0.97-1.32)	1.78*** (1.41-2.25)	1.49*** (1.25-1.78)	1.96*** (1.55-2.48)								
Female Gender	1.37*** (1.17-1.59)	1.54*** (1.27-1.88)	1.03 (0.87-1.22)	1.28** (1.06-1.55)	1.60*** (1.37-1.87)	0.91 (0.73-1.14)	1.32*** (1.11-1.56)	1.22 (0.98-1.52)								
Ethnicity (Not White)	1.81*** (1.28-2.55)	1.30 (0.84-2.01)	1.59* (1.08-2.36)	1.25 (0.80-1.94)	1.95*** (1.39-2.75)	1.07 (0.66-1.74)	1.54* (1.03-2.29)	0.92 (0.55-1.53)								
Parents Not Intact	1.57*** (1.32-1.87)	1.08 (0.85-1.38)	1.57*** (1.29-1.91)	1.18 (0.94-1.49)	1.66*** (1.39-1.97)	1.16 (0.89-1.51)	1.71*** (1.41-2.08)	1.25 (0.97-1.61)								
Parent Mental Problem	1.75*** (1.46-2.19)	1.01 (0.77-1.32)	1.60*** (1.27-2.01)	1.09 (0.84-1.41)	1.85*** (1.51-2.27)	0.88 (0.65-1.19)	1.73*** (1.38-2.17)	0.87 (0.64-1.17)								
Low Mother's Education	1.34* (1.07-1.67)	1.14 (0.87-1.49)	1.32* (1.02-1.69)	1.16 (0.88-1.53)	1.47*** (1.18-1.84)	1.22 (0.91-1.65)	1.35* (1.05-1.73)	1.17 (0.86-1.60)								
Father Unemployed	1.34** (1.10-1.63)	0.99 (0.78-1.25)	1.42** (1.14-1.76)	1.04 (0.82-1.31)	1.29* (1.05-1.59)	1.12 (0.87-1.43)	1.36** (1.09-1.69)	1.05 (0.80-1.36)								
Stressful Life Experiences																
Experienced Bullying	2.19*** (1.88-2.56)	1.94*** (1.60-2.34)	2.04*** (1.71-2.44)	1.56*** (1.30-1.88)	2.59*** (2.20-3.04)	1.53*** (1.24-1.89)	2.16*** (1.81-2.58)	1.51*** (1.23-1.86)								
Experienced Racism	2.25*** (1.84-2.76)	1.39* (1.01-1.92)	2.52*** (2.01-3.15)	1.59*** (1.24-2.05)	2.28*** (1.86-2.80)	1.51** (1.15-1.99)	2.60*** (2.09-3.24)	1.81*** (1.36-2.36)								
Experienced Bereavement	1.79*** (1.53-2.09)	1.21* (1.00-1.47)	1.85*** (1.55-2.20)	1.51*** (1.25-1.83)	1.51*** (1.29-1.77)	1.49*** (1.21-1.83)	1.79*** (1.50-2.13)	1.41** (1.18-1.84)								

Note. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$; CI = Confidence Interval

	Auditory Hallucinations				Visual hallucinations				Paranoid Thoughts				Risk Status			
	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)		
Emotional/Behavioral Problems																
Experienced Depression	3.30*** (2.79-3.98)	1.65*** (1.31-2.08)	3.48*** (2.87-4.21)	1.53*** (1.28-1.91)	3.60*** (3.05-4.25)	1.83*** (1.41-2.37)	4.07*** (3.39-4.88)	1.86*** (1.44-2.40)								
Feel Angry	2.72*** (2.30-3.22)	1.37** (1.09-1.71)	2.35*** (1.96-2.83)	1.56*** (1.28-1.91)	2.55*** (2.16-3.02)	1.27* (1.01-1.58)	2.78*** (2.30-3.37)	1.38** (1.10-1.74)								
School Misconduct	2.40*** (2.01-2.87)	1.80*** (1.40-2.33)	3.09*** (2.56-3.73)	1.58*** (1.22-1.91)	2.91*** (2.44-3.47)	1.90*** (1.44-2.52)	3.10*** (2.56-3.75)	1.85*** (1.37-2.49)								
Substance Use																
Cannabis Lifetime	1.76*** (1.44-2.15)	1.04 (0.73-1.49)	1.91*** (1.54-2.38)	1.20 (0.83-1.72)	2.04*** (1.67-2.49)	1.10 (0.71-1.71)	2.24*** (1.81-2.77)	1.35 (0.91-2.01)								
Cannabis 30 Days	2.12*** (1.69-2.65)	1.47* (1.21-1.78)	2.41*** (1.89-3.06)	1.24 (0.83-1.84)	2.70*** (2.17-3.36)	1.26 (0.79-2.00)	2.69*** (2.12-3.40)	1.25 (0.82-1.91)								
Risky Alcohol	1.33*** (1.14-1.56)	1.15 (0.89-1.48)	1.54*** (1.30-1.83)	0.92 (0.69-1.21)	1.74*** (1.49-2.04)	1.03 (0.77-1.38)	1.62*** (1.35-1.93)	0.93 (0.69-1.26)								
Substance Use/Dependence	1.99*** (1.66-2.38)	0.99 (0.75-1.33)	2.18*** (1.80-2.65)	1.11 (0.82-1.50)	2.30*** (1.92-2.74)	1.10 (0.80-1.51)	2.38*** (1.97-2.89)	1.07 (0.77-1.50)								
Personal Resources																
Low Self-Esteem	3.60*** (3.02-4.28)	1.27 (0.97-1.66)	3.05*** (2.52-3.70)	1.91*** (1.38-2.38)	3.53*** (2.95-4.22)	1.61** (1.19-2.19)	4.03*** (3.34-4.86)	1.66*** (1.24-2.22)								
Low Optimism	2.83*** (2.39-3.36)	1.66*** (1.31-2.10)	2.52*** (2.08-3.04)	1.22 (0.96-1.56)	3.38*** (2.87-3.99)	1.12 (0.85-1.48)	3.56*** (2.96-4.28)	1.54*** (1.18-2.00)								
Low Personal Competence	2.17*** (1.80-2.60)	0.79 (0.61-1.03)	1.97*** (1.60-2.42)	0.80 (0.61-1.04)	2.31*** (1.91-2.78)	0.77 (0.52-1.14)	2.37*** (1.94-2.89)	0.75 (0.56-1.01)								
Low Seeking Support Coping	1.21* (1.01-1.47)	1.19 (0.93-1.53)	1.21 (0.98-1.50)	1.03 (0.82-1.30)	1.33** (1.09-1.62)	1.00 (0.76-1.31)	1.42*** (1.16-1.76)	1.20 (0.92-1.55)								

Low Problem Solving Coping	1.68***	(1.39-2.03)	1.08	(0.85-1.38)	1.72***	(1.40-2.12)	1.19	(0.94-1.51)	1.67***	(1.37-2.03)	1.16	(0.88-1.51)	1.89***	(1.54-2.31)	1.15	(0.89-1.5)
High Avoidance Coping	2.51***	(2.10-2.99)	1.52***	(1.22-1.89)	2.59***	(2.11-3.19)	1.35**	(1.09-1.68)	2.94***	(2.46-3.52)	1.48**	(1.15-1.91)	2.86***	(2.34-3.49)	1.50***	(1.18-1.90)

Table 3. Psychological, Substance Use, and Personal Factor Correlates of Psychotic Like Experiences (PLEs) and Risk Status

Note. * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$; CI = Confidence Interval