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Changes in self-concept and risk of psychotic experiences in adolescence: a longitudinal population based cohort study.

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Abstract

Background: Psychotic experiences (PEs) are commonly reported in adolescence and are associated with a range of negative outcomes. Few targets for intervention for PEs have been identified. One potential target is self-concept: an individual's beliefs about his/her personal attributes. Improvements in self-concept has been shown to reduce psychotic symptoms in patients with schizophrenia but no study has investigated the relationship between changes in self-concept and risk of PEs in the general population.

We aimed to investigate:(1) the relationship between child and adolescent self-concept and adolescent PEs; and (2) whether changes in self-concept between childhood and adolescence were associated with risk of adolescent PEs.

Method: Using data from age-9 and age-13 (n=7423) of the child cohort (Cohort'98) from the Growing Up in Ireland study we investigated the relationship between self-concept at age-9 and-13 and PEs at age-13. PEs were measured using the Adolescent Psychotic Symptoms Screener and self-concept was measured using the Piers Harris-II. Using a stratified analysis, we investigated the relationship between change in self-concept between age-9 and age-13 and the risk of PEs at age-13. Additionally we investigated changes across the six self-concept sub-scales.

Results: PEs were reported by 13% of participants at age-13. "Very-low" self-concept at age-9 was associated with an increased risk of PEs at age-13 (Adjusted-OR:2.74,CI:1.80-4.19), and "High" self-concept at age-9 was associated with a decreased risk of PEs at age-13 (Adjusted-OR:0.77,CI:0.60-0.97). The stratified analysis indicated that improvements in self-concept reduced the odds of adolescent PEs and decline in self-concept increased the odds of adolescent PEs. This effect was noted across the majority of the self-concept sub-scales.

Conclusion: There is a strong relationship between self-concept and PEs. The antecedents of low self-concept may be a useful target for preventative psychiatry. Broad-spectrum interventions targeting self-concept in childhood may help to reduce the incidence of PEs in adolescence.

Keywords: Psychotic experiences, Self-concept, Child Development, Preventative Psychiatry.

Abbreviations: PEs: Psychotic Experiences

Introduction

Psychotic experiences (PEs) are commonly reported in early adolescence (Kelleher, Connor, et al., 2012) and are associated with a wide range of adverse outcomes, including increased risk of mental disorder, suicidal behaviour and psycho-social dysfunction (Kelleher, Keeley, et al., 2012; Linscott & van Os, 2013; Scott, Chant, Andrews, & McGrath, 2006; Svirskis et al., 2007).

A wide range of risk factors for PE have been identified, see *Kelleher and Cannon* for summary (Kelleher & Cannon, 2011). However, to date there has been limited attention given to early life psychosocial risk factors for PEs. One early psychosocial characteristic that emerges during childhood is self-concept (Montemayor & Eisen, 1977). Self-concept is an organised, a multi-faceted construct (Shavelson, Hubner, & Stanton, 1976), that refer to the sum of an individual's beliefs and knowledge about his/her personal attributes and qualities (Mann et al., 2004). Self-esteem is the evaluative and affective dimension of self-concept (Harter, 1999) and these terms are frequently used inter-changeably (Piers & Herzberg, 2002). Low self-concept has been linked with vulnerability to common mental disorder (Mann, Hosman, Schaalma, & de Vries, 2004) and meta-analytic data suggests that school based intervention targeting self-concept improves symptoms of common mental disorder and academic performance (Haney & Durlak, 1998).

Within the context of psychosis, limited available data suggest that self-concept is reduced among individuals who report psychotic phenomena across the psychosis continuum. In clinical populations, patients with schizophrenia report more negative self-concepts (Close & Garety, 1998) and this has been strongly associated with positive symptoms (hallucinations and delusions) (Barrowclough et al., 2003). Similar findings have also been observed in individuals at ultra-high risk for psychosis (Carol & Mittal, 2015; Morrison et al., 2006). Within the general population, it has been reported that low self-concept is a risk factor for PEs (Krabbendam et al., 2002) and

within adolescence, those with PEs were four times more likely to have concurrent low self-concept (Dolphin, Dooley, & Fitzgerald, 2015).

Two pilot randomised control trials using cognitive behavioural therapy aimed at improving self-concept in individuals with psychotic disorders suggested that improving self-concept successfully reduced positive symptoms and improved social functioning (Hall & Tarrrier, 2003; Lecomte et al., 1999). Given these findings in patient populations, it is possible that improving self-concept may reduce the risk of PEs in the general population and conversely a decrease in self-concept may increase the risk of PEs. To-date, no study has investigated the relationship between changes in self-concept between childhood and adolescence and the risk of PEs in young people within the general population.

The main aims of this study were to, using a longitudinal nationally representative population sample, investigate: 1) the longitudinal relationship between self-concept at age-9 (childhood) and PEs at age-13 (adolescence); 2) the cross-sectional relationship between self-concept and PEs in adolescence; 3) if changes in self-concept (improvement or a decline) between childhood and adolescence are associated with risk of adolescent PEs; and 4) if changes in the sub-scales of self-concept between childhood and adolescence are associated with risk of adolescent PEs.

Method

Participants.

Participant were members of the Child cohort (Cohort '98) of the *Growing Up in Ireland* (GUI) study. The GUI study is a longitudinal, nationally representative sample of children from the general population in Ireland. Participants were 8,658 children and their families who were recruited from over 900 national primary schools at age 9 years. Four years later, at age 13, all 8,658 were targeted for re-recruitment and 7423 were interviewed (88% retention). A frequency weight was applied to the data to ensure that the sample was representative of the general

population. The frequency weight was calculated using parameters from the 2006 Census of the Irish Population. A minimum information algorithm that fits the population marginal was used in a regression framework and the sample estimates were adjusted so that they match the population parameter (for further information Thornton et al., 2016). To account for demographic difference between those who took part at wave two and who did not the sample was reweighted. This reweighting took into account differences in attritions in: study child gender, family structure, primary care giver age, primary and secondary care givers economic status, primary and secondary care givers social class, ethnicity and accommodation tenure status. Additional adjustments were made for wave one variables associated with wave two attrition. These include primary care giver smoking, drinking and depression, size of the household and wave one income quintile. The final reweighting adjustment reflected the population level of children who were living in Ireland at nine years and who continued to residence in Ireland at 13 years (Thornton et al., 2016).

Ethical Considerations. The GUI received ethical approval from the Health Research Board's research ethics committee in Ireland. Ethical Approval for this secondary analysis was granted by the Research Ethics Committee of the Royal College of Surgeons in Ireland's.

Measurement

Outcome variable. Psychotic experiences (PEs) were measured using the *Adolescent Psychotic Symptoms Screener* (APSS) (Kelleher, Harley, Murtagh, & Cannon, 2011). The APSS is a self-report questionnaire comprising of seven psychotic symptoms including questions pertaining to hallucinatory and delusional experiences, six of which were included in the GUI survey instrument (listed below). The one item not included in the GUI study ("Have you ever had messages sent to you through TV or Radio") was shown to have 0% positive predictive value for that particular type of phenomena and only 40% positive predictive value for any type of psychotic experience (Kelleher, Harley, Murtagh, & Cannon, 2011).

- 1) Have you ever heard voices or sounds that no-one else can hear?
- 2) Have you ever seen things that other people could not see?
- 3) Have you ever thought that people are following you or spying on you?
- 4) Some people believe that their thoughts can be read by another person. Have other people ever read your mind?
- 5) Have you ever felt that you were under the control of some special power?
- 6) Have you ever felt that you have extra-special powers?

The participating children were required to respond by circling “No” (0 points), “Maybe” (0.5 points) or “Definitely” (1 point) to each item. PEs were measured as a dichotomous variable and were defined as scoring two or more points on the APSS or a response of “definitely” to the question about auditory hallucinations. Both of these measurements have been validated against clinical interview and have been shown to have good sensitivity and specificity for PEs (two or more points: 70% and 86%; and auditory hallucination: 70% and 100%, respectively). The APSS was administered in the GUI at age 13 only.

Exposure variables. Self-concept was measured using the Piers Harris-II (Piers & Herzberg, 2002), which was administered at both age 9 and age 13. The Piers Harris II is a 60 item self-report questionnaire which is designed to assess self-concept in young people aged between seven and eighteen. It is comprised of six sub-scales comprising:

- 1) *Behavioural Adjustment*: 14 items, e.g. “I cause trouble to my family”; and “I am a well behaved in school”.
- 2) *Intelligence and School Status*: 16 items, e.g. “I am an important member of my class”; and “I forget what I learn”.

- 3) *Physical Appearance and Attributes*: 11 items, e.g. “My classmates in school think I have good ideas”; and “My looks bother me”.
- 4) *Freedom from Anxiety*: 14 items, e.g. “I worry alot”; and “I like being the way I am”.
- 5) *Popularity*: 12 items, e.g. “I feel left out of things”; and “I have many friends”.
- 6) *Happiness and Satisfaction*: 10 items, e.g. “I am a good person”; and “I wish I were different”.

The participating children were asked to respond “yes” or “no” to each statement regarding their perceptions of themselves. Total scores were transformed into t-scores and divided into categories in accordance with Piers Harris (2002). Total Score categories were: Very Low (<2nd percentile), Low (3rd-14th percentile), Low Average (15th-28th percentile), Average (29th-71st percentile), Above Average (72nd-83rd percentile), High (84th-97th percentile) and Very High (>98th percentile).

Confounding variables. Adjustment were made for a number of confounding variables which might have influenced the relationship between self-concept and PEs (see Table one). These included: a) demographic variables; b) family history of psychiatric disorder, c) childhood and adolescent psychopathology; and d) exposure to early life stress. Each of these variables has been shown to increase the risk of PEs (Linscott & van Os, 2013; Lancefield et al., 2016; McGrath et al., 2017) and have also associated with self-concept (Piers & Herzberg, 2002; and Harter, 2012).

a) Demographic Variables. The participating child’s age, gender, handedness, nationality (Irish or non-Irish nationality), the primary care givers ethnic background (White Irish, White non-Irish, Black or Asian/Other) and urbanicity (living in a rural or urban area) were investigated. Urban areas were defined as living in an area with a population density of >10,000 people. Additionally, two proxies of socio-economic status were investigated; the Primary Care Givers (PCG) highest educational attainment (None/Primary education only to Post-graduate education) and annual Income in quintiles (Lowest quintile to highest).

b) *Family history of psychiatric disorder.* Family history of psychiatric disorder was reported by the PCG at age 13.

c) *Psychopathology.* Psychopathology was defined as scoring above the ‘Abnormal’ cut-off on the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 2001). Item responses on the SDQ were reported by the PCG at age 9 and 13.

d) Exposure to a high number of early life stressors. The GUI investigated 13 specific early life stressors to which the child may have been exposed to. These included death of a parent, death of a close family member, death of a friend, divorce/separation of parents, moving house within Ireland, moving country, staying in foster home, serious illness/injury, serious illness/injury of a family member drug taking or alcoholism in the immediate family, conflict between parents, parent in prison, other disturbing event. These were reported by the PCG. We used a binary cut off of three or more stressors (8.2% of the total sample) reported at age 13.

Statistical analysis

All statistical analyses were conducted using Stata 15.

Prevalence and demographics characteristics of participants with or without Psychotic Experiences.

T-tests and logistic regressions were used to examine the difference in the demographic and clinical characteristic between participants with and without PEs. Subsequent analyses were adjusted for variables where differences were observed between the two groups (see Table 1). A supplementary analysis was conducted investigating the relationship between self-concept and psychopathology (above the abnormal cut off of the SDQ scale) at both waves of the study. This was conducted using logistic regression and the results are depicted in supplementary materials.

Aim 1. The longitudinal association between child self-concept and adolescent psychotic experiences.

The relationship between childhood self-concept and adolescent PEs was investigated using binary logistic regression with PEs as the outcome variable and childhood self-concept as the exposure variable. We investigated total self-concept score (as a categorical and continuous variable). Adjustments were made for differences in the confounding variables that were observed between those with and without PEs.

Aim 2. The cross-sectional association between child self-concept and adolescent psychotic experiences.

The relationship between adolescent self-concept scores and adolescent PEs was investigated using binary logistic regression with PEs as the outcome variable and childhood self-concept as the exposure variable. We investigated total self-concept score (as a categorical and continuous variable). Adjustments were made for differences in the confounding variables that were observed between those with and without PEs. Additionally, we adjusted for childhood self-concept and we report adjusted and unadjusted odds ratios.

Aim 3. Change in self-concept between childhood and adolescence and risk of adolescent psychotic experiences.

To investigate the relationship between changes in self-concept and risk of adolescent PEs the self-concept scores were stratified into one of three groups (Low, Average and High). This was done for both the childhood and adolescent self-concept scores. The very low, low and low average categories were collapsed into a 'Low' category (childhood prevalence: 31%; adolescent prevalence: 29%). Average category remained 'Average' (childhood prevalence: 42%; adolescent prevalence: 43%). High average, high and very high categories were collapsed into a 'High' category (childhood prevalence: 27%; adolescent prevalence: 28%). We then investigated if

increases in the self-concept between childhood and adolescent (i.e. reporting low self-concept in childhood and high self-concept in adolescence) was associated with a reduced risk for adolescent PEs and 2) if decreases in self-concept (i.e. high self-concept in childhood and low self-concept in adolescence) increased the risk of PEs. This analysis was conducted using logistic regressions. Again, adjustments were made for demographic and clinical differences between controls and PEs. We report the adjusted and unadjusted odds ratios.

Aim 4. Change in self-concept sub-scales between childhood and adolescence and risk of adolescent psychotic experiences.

Finally, we investigated the relationship between changes in the self-concept sub-scales scores and risk of adolescent PEs. This was conducted using the same approach described above in Aim 3. Self-concept sub-scale categories were stratified into three groups in childhood and adolescence (Low, Average and High). We then investigated if increases in the self-concept sub-scale between childhood and adolescent (i.e. reporting low popularity in childhood and high popularity in adolescence) was associated with a reduced risk for adolescent PEs and 2) if decreases in self-concept sub-scale (i.e. high popularity in childhood and low popularity in adolescence) increased the risk of PEs. This analysis was conducted using logistic regressions with adjustments were made for differences in the confounders between controls and PEs. Additionally adjusting for all other self-concept sub-scale scores at adolescence.

Results

Prevalence and Demographic Characteristics of Adolescents Who Reported Psychotic Experiences.

PEs were reported by 13% (n=934) of adolescents at age 13. Demographic characteristics are presented in Table 1.

Participants with PEs were significantly more likely to be female, non-Irish, live in an urban area, have a family history of mental disorder, have had psychopathology in childhood and have psychopathology in adolescence and to have experienced three or more stressful life events (see Table 1). In terms of self-concept, 33% of those with childhood psychopathology and 29% of those with adolescent psychopathology report self-concept scores below the 14th percentile (low or very low) in childhood. Thirty-four percent of those with adolescent psychopathology reported self-concept scores below the 14th percentile in adolescence.

Table 1. The prevalence and odds ratios for the characteristics of participants with and without adolescent PEs.

Insert Table 1

Aim 1. The longitudinal association between child self-concept and adolescent psychotic experiences.

Childhood Self-Concept and Adolescent PEs. There was a significant relationship between childhood self-concept and adolescent PEs (see Table 2 and Figure 1). Twenty-five percent of individuals who reported PEs in adolescence scored below the 14th percentile for self-concept in childhood, compared with 13% of those who did not report PEs in adolescence. Those who reported PEs in adolescence were three times more likely to have scored within the poorest self-concept category in childhood (see Figure 1). Additionally, those who reported PEs in adolescence were over 30% less likely to have had high self-concept in childhood. The results indicated a linear dose-response relationship such that for every unit increase in childhood self-concept the odds of adolescent PE reduced by 1.04 (see Table 2). Adjusting for confounders had some effect in low and very categories but had a limited effect on all other categories.

Table 2. The relationship between childhood (Wave 1) and adolescent (Wave 2) self-concept and PEs.

Insert Table 2

Aim 2. The cross-sectional association between child self-concept and adolescent psychotic experiences.

Adolescent Self-Concept and Adolescent PEs. There was a strong relationship between adolescent self-concept and PEs (see Table 2). Almost 40% of participants with PEs scored below the 14th percentile on self-concept in adolescence (13% of controls). Those who reported very low self-concept were six times more likely to have reported PEs. Additionally, those who reported above average to high self-concept were 2-3 times less likely to report PEs. Similar to childhood, the results indicated a dose-response relationship such that every unit increase self-concept was associated with a 1.08 reduced odds of adolescent PE (see Table 2).

Figure 1. Odds-ratios for the relationship between the self-concept and PEs.

Insert Figure 1

Aim 3 and 4. Change in self-concept (total and subscale scores) between childhood and adolescence and risk of adolescent psychotic experiences.

A stratified investigation was conducted to investigate if an increase or decrease in self-concept between age 9 and age 13 was associated with risk of PEs at age 13. Participants were stratified into three groups using self-concept data from their wave one (age 9) reports: Low self-concept,

Average self-concept and High self-concept. We investigated if changes in self-concept (improvement or a decline) between childhood and adolescence are associated with risk of adolescent PEs.

Table 3. The Prevalence and Odds ratios of the change in self-concept score by adolescence for children who reported low, average and high self-concept in childhood.

Insert Table 3

Low Self-concept reported in Childhood. In total, 42% of the participants with low self-concept scores at age 9 also reported low self-concept scores at age 13 (see Table 3). Twenty-seven percent of those with persistently low self-concept had PEs at 13. Forty-two percent of those with low childhood self-concept improved to average by adolescence while 16% improved to high. Improvement in self-concept was associated with an incremental reduction in the likelihood of PEs, such that those whose self-concept improved to within the average range by adolescence were 2.3 time less likely to report PEs than those who had persistently low self-concept. Those whose self-concept improved to within the high range were 5.5 time less likely to report PEs than those who had persistently low self-concept. Improvements in all subscale categories with the exception of ‘Physical Appearance and Attributes’ were associated with reduction in a risk of PEs (see Table 4).

Average Self-concept reported in Childhood. Of those who reported average self-concept at in childhood, 45% continued to score in the average self-concept category in adolescence. Self-concept worsened in 28% of participants and 24% of those whose self-concept worsened report PEs. Children whose self-concept scores declined from average to low by adolescence were

significantly more likely to report PEs (see Table 3). Scoring in a lower category on ‘Happiness and Satisfaction’, ‘Behavioural Adjustment’, ‘Freedom from Anxiety’ and ‘Popularity’ sub-scales were associated with an increased risk of PEs (see Table 4). Self-concept improved in 27% of participants and children whose self-concept improved were significantly less likely to have PEs. Specifically, improvements in ‘Behavioural Adjustment’ and ‘Freedom from Anxiety’ subscales significantly reduced the odds of PEs.

High Self-concept reported Childhood. In total, 44% of those with high self-concept in childhood continued to report high self-concept in adolescence. Self-concept declined from high to average in 40% of participants and decline to low in 15% of participants. Twenty percent of participants whose self-concept declined from high to low reported PEs. Those participants whose self-concept scores worsened between childhood and adolescence were significantly more-likely to report PEs in adolescence such that there was an incremental increase in the odds of PEs with each drop in self-concept category (see Table 3). Adjusting for confounders had a limited effect on these values. Declines in ‘Happiness and Satisfaction’, ‘Behavioural Adjustment’, ‘Intelligence and School Status’ and ‘Popularity’ sub-scales were associated with an increased risk of PEs (see Table 4).

Table 4. Odds ratios of the change in self-concept subscale category by adolescence for children who reported low, average and high scores in childhood.

Insert Table 4

Discussion

In a large nationally representative community sample, we demonstrated, for the first time to our knowledge, that there is a strong relationship between changes in self-concept between childhood and adolescence and risk of adolescent PEs. Self-concept in childhood and adolescence was associated with adolescent PEs and this relationship was beyond what could be explained by

differences in the confounding variables. A change in self-concept between childhood and adolescence was robustly associated with risk of PEs, such that as self-concept declined the risk of PEs increased and as self-concept improved the risk of PEs decreased. These findings were evident in participants with low, average and high self-concept and were also evident across the different self-concept sub-scales.

Our results complement findings from other adolescent and adult general population studies, which indicate that PEs are associated with low self-concept (Dolphin et al., 2015; Krabbendam et al., 2002). Importantly, our results suggest that a proportion of those who report PEs in adolescence already have poorer self-concept in childhood and are potentially identifiable. For example, within this study 26% of those who report PE in adolescence had reported low or very low self-concept in childhood (13% in controls) and almost a third of those who persistently report low self-concept had PEs in adolescence. Persistent psychopathology has also been shown to increased likelihood of PEs (Lancefield, Raudino, Downs, & Laurens, 2016) and our results suggest that early psychosocial characteristic may also be useful in identifying those at risk of PEs and those who require intervention.

Importantly, our ‘change’ analysis supports the hypothesis that intervening in self-concept or maintaining high self-concept could reduce the incidence of PEs in adolescence. Meta-analysis has previously demonstrated that intervention in self-concept improves outcomes in common mental disorders (Haney & Durlak, 1998). Similar interventions have been effective in reducing positive clinical symptoms in patients with psychosis (Hall & Tarrier, 2003; Lecomte et al., 1999). Our results suggest that interventions aimed at improving self-concept may also have positive effects on the incidence of adolescent PEs in the general population. This effect can be achieved by elevating any sub-components of self-concept. Further clinical research is necessary to directly test this hypothesis.

While it remains to be tested, it is plausible that the relationship between self-concept and PEs is in fact bi-directional, as has been previously demonstrated with non-psychotic psychiatric symptoms (Markowitz, 2001; Rosenberg, Schooler, & Schoenbach, 1989). It is conceivable there is a dynamic interplay between self-concept and any form of psychopathology, such that an improvement in how one thinks about oneself will be associated with a decline in psychopathology (psychotic or non-psychotic) and, conversely, an increase in psychopathology will be associated with a decline in how one thinks about oneself. Unfortunately, PEs were not investigated at the first wave of the study and, therefore, we cannot investigate the bi-directional relationship between PEs and self-concept. Future research should investigate the directionality of this relationship.

These results suggest that intervening in self-concept in childhood may have the potential to decrease the incidence of PEs in adolescence. Programmes focusing on improving and maintaining high self-concept would be a useful, broad-spectrum approach to improving well-being and symptomology in the general population (Mann et al., 2004). Such broad-spectrum interventions in childhood presents a real opportunity to investigate strategies in preventative psychiatry at the sub-clinical level before a severe mental disorder becomes embedded. Additionally, such interventions would aid in the early identification of those who will require support from psychiatric services. This may be particularly important for high-risk groups such as those reporting psychotic experiences as they are vulnerable to a wide range of adverse outcomes (Cederlof et al., 2017; Kaymaz et al., 2012; McGrath et al., 2016).

In addition to targeting self-concept itself, preventative psychiatry may also consider targeting the antecedents of low self-concept. It is plausible that self-concept in fact mediates the relationship between certain exposures such as childhood trauma or victimisation and PEs. For example, it has been reported that the clarity of one's self-concept mediated the relationship between psychosis group membership and total childhood trauma score and specific individual traumas such as

emotional and physical abuse (Evans et al., 2015). Such an investigation has yet to be conducted in a non-clinical sample. While low self-concept has been associated with increased risk psychiatric outcomes, there is little research investigating the origins of low self-concept, particularly in childhood (Orth & Robins, 2014). Both traumatic experiences and attachment processes have been proposed to play a role in the formation of self-concept (Harter, 2012), however there is a little quantitative evidence directly investigating these claims and the evidence to date is inconsistent (Orth et al., 2010). Further research is necessary to fully establish the antecedents of low self-concept in childhood.

Strengths and Limitations

There were several strengths to the study: this is a large scale, nationally representative longitudinal cohort of children. There was an excellent sample retention rate (88%) and the reweighting of the data at age 13 ensured representation, therefore we are confident that there was minimal bias due to loss to follow-up. The Piers Harris II is a widely used validated measure of self-concept (Piers & Herzberg, 2002). Psychotic experiences were measured using a self-report instrument that was explicitly validated within this age range (Kelleher et al., 2011). However, self-report questionnaire measures of psychotic experiences are known to have a greater susceptibility to false positives than interview (van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009). One limitation is that PEs were not assessed at the first wave of the study and we were not able to investigate for a bi-directional relationship between self-concept and psychotic experiences.

Conclusion

There is a strong relationship between self-concept and psychotic experiences. This relationship is such that improvements in self-concept reduces the likelihood of adolescent PEs and decline in self-concept increases the likelihood of adolescent PEs. Self-concept and the origins of low self-

concept may be a useful target for preventative psychiatry and these results suggest that intervening in self-concept between childhood and adolescence may to reduce the incidence of PEs in adolescence. Future research should formally test the effect of self-concept interventions on PEs.

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Key Points:

What's known: Psychotic experiences (PEs) are commonly reported in childhood, associated with a wide range of adverse outcomes and few targets aimed at preventing these phenomena have been identified. One potential target is self-concept (a set of attitudes reflecting description and evaluation of one's own behavior and attitudes).

What's new: We demonstrate that improvements in self-concept reduces the odds of adolescent PEs and decline in self-concept increases the odds of adolescent PEs. This effect was robust across the self-concept sub-scales.

What's clinically relevant: Interventions targeting self-concept or the origins of low self-concept in childhood are likely to reduce the incidence of PEs in adolescence.

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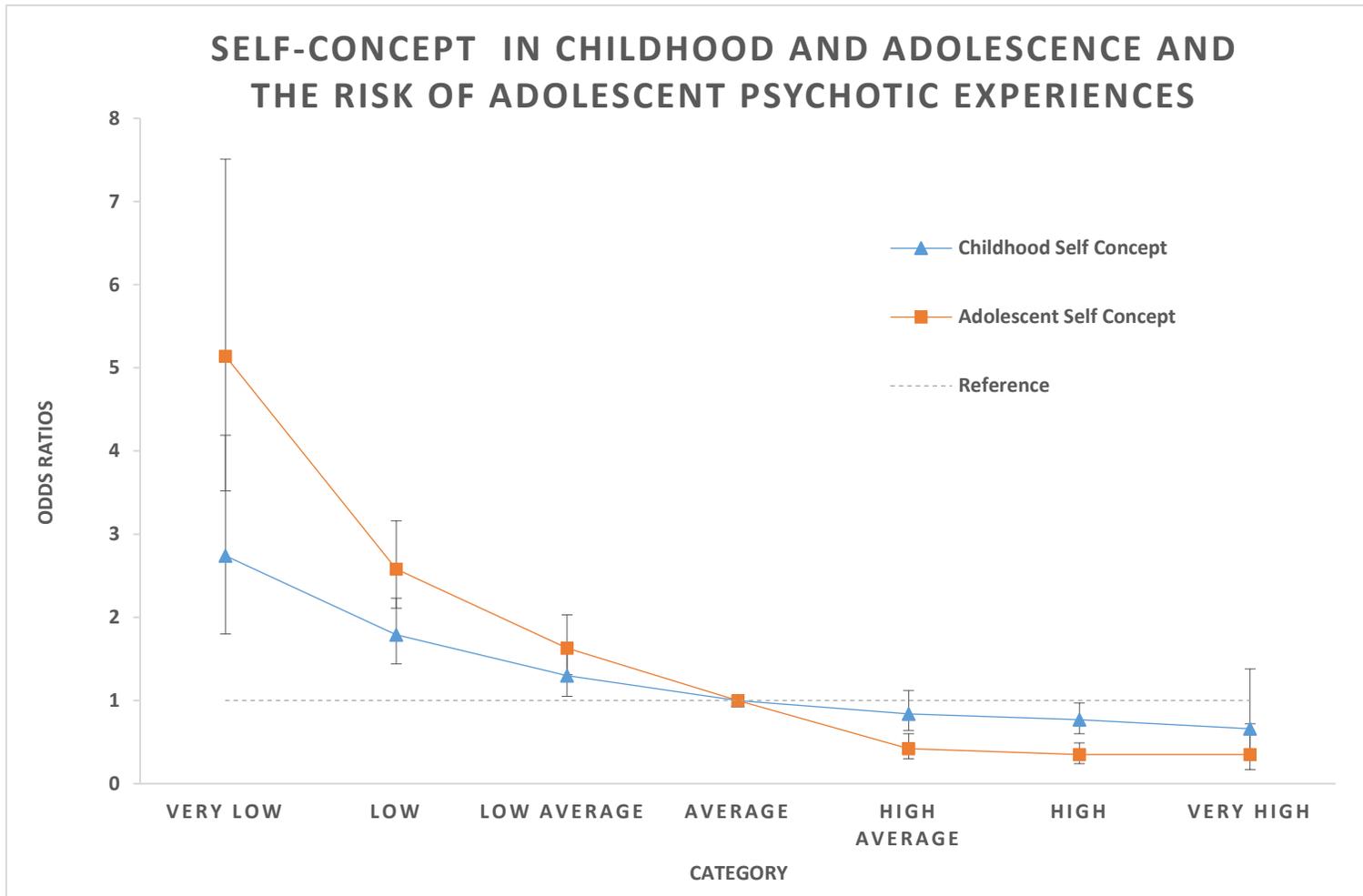
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Table 1. The prevalence and odds ratios for the characteristic of the participants with and without adolescent PEs.

CHARACTERISTICS	CONTROLS	PSYCHOTIC EXPERIENCES	OR (CI)
DEMOGRAPHIC			
AGE (MEAN, SD)	13.01 (0.11)	13.02 (0.15)	0.015^a
GENDER (% OF MALES)	51.98	42.83	1.26 (1.09-1.44)
HANDEDNESS (% LEFT HANDED)	13.42	14.28	0.92 (0.74-1.13)
NATIONALITY (% OF IRISH)	89.74	86.87	1.40 (1.14-1.73)
URBANICITY (% LIVING IN URBAN AREA)	12.76	15.87	1.29 (1.06-1.57)
PRIMARY CARE GIVERS CULTURAL BACK GROUND (%)			
• WHITE IRISH	91.55	88.41	-
• WHITE NON-IRISH	6.18	8.31	1.58 (1.22-2.04)
• BLACK	1.40	1.85	1.81 (1.07-3.04)
• ASIAN/OTHER	0.86	1.44	1.07 (0.58-1.98)
SOCIO-ECONOMIC STATUS (PRIMARY CARE GIVERS HIGHESET LEVEL OF EDUCATION %)			
• NONE/PRIMARY	3.46	3.94	1.03 (0.58-1.83)
• LOWER SEC	16.23	18.82	1.16 (0.90-1.48)
• HI SEC/TECH VOC/UPPER SEC	39.19	38.11	-
• NON DEGREE	19.53	17.98	0.97 (0.80-1.17)
• PRIMARY DEGREE	12.92	12.36	0.91 (0.73-1.13)
• POST GRAD	8.67	8.79	0.96 (0.76-1.21)
ANNUAL INCOME QUINTILE (FAMILY %)			
• LOWEST	20.84	19.99	1.14 (0.82-1.42)
• 2 ND	19.51	24.6	1.19 (0.94-1.52)
• 3 RD	19.22	21.64	-
• 4 TH	21.34	14.35	0.83 (0.65-1.05)
• HIGHEST	19.09	19.43	1.01 (0.81-1.26)
FAMILY HISTORY OF PSYCHIATRIC DISORDER (%)	2.96	4.66	1.84 (1.30-2.61)
CHILDHOOD PSYCHOPATHOLOGY (%)	6.28	12.06	2.18 (1.69-2.79)
ADOLESCENT PSYCHOPATHOLOGY (%)	5.31	10.99	2.42 (1.86-3.14)
THREE OR MORE STRESSFUL LIFE EVENTS BY ADOLESCENCE (%)	7.69	11.59	1.55 (1.22-1.97)

Note: Emboldened metrics denote significant differences ($p < .05$). ^a: p-value report instead of odds ratio.

Figure 1. Odds-ratios for the relationship between the self-concept and adolescent psychotic experiences.



Childhood self-concept score are adjusted for age, gender, nationality, cultural background and urbanicity, family history of mental disorder, child psychopathology and exposure to three or more stressful life events. Adolescent self-concept score are adjusted for age, gender, nationality, cultural background, urbanicity, family history of mental disorder, child and adolescent psychopathology, exposure to three or more stressful life events and childhood self-concept.

Table 2. The relationship between childhood (Wave 1) and adolescent (Wave 2) self-concept and psychotic experiences.

TOTAL SELF CONCEPT SCORES CATEGORY (%)	CHILDHOOD SELF CONCEPT AND ADOLESCENT PEs (AGE 9)				ADOLESCENT SELF CONCEPT IN ADOLESCENCE PEs (AGE 13)				
	Controls	Children who report PEs in adolescence	Unadjusted Odd Ratio (CI)	Adjust 1 Odds Ratio (CI)	Controls	Participants reporting PEs	Unadjusted Odd Ratio (CI)	Adjust 2 Odds Ratio (CI)	Adjust 3 Odds Ratio (CI)
VERY LOW ($\leq 2^{\text{ND}}$ %ILE)	2.18	4.69	3.10 (2.05-4.68)	2.74 (1.80-4.19)	1.31	7.95	6.62 (4.65-9.42)	5.96 (4.15-8.57)	5.14 (3.52-7.51)
LOW (3^{ND} - 14^{TH} %ILE)	11.05	21.90	1.92 (1.55-2.38)	1.79 (1.44-2.23)	11.34	29.58	2.84 (2.36-3.44)	2.71 (2.24-3.28)	2.58 (2.11-3.16)
LOW AVERAGE (15^{TH} - 28^{TH} %ILE)	15.62	16.65	1.34 (1.09-1.66)	1.30 (1.05-1.62)	12.74	17.77	1.71 (1.39-2.11)	1.65 (1.34-2.04)	1.63 (1.31-2.03)
AVERAGE (29^{TH} - 71^{TH} %ILE)	43.38	37.64	-	-	43.77	34.29	-	-	-
ABOVE AVERAGE (72^{TH} - 83^{TH} %ILE)	10.16	8.46	0.84 (0.63-1.10)	0.84 (0.64-1.12)	12.74	5.34	0.41 (0.29-0.57)	0.41 (0.29-0.58)	0.42 (0.30-0.60)
HIGH (84^{TH} - 97^{TH} %ILE)	16.02	9.04	0.75 (0.59-0.95)	0.77 (0.60-0.97)	14.69	4.08	0.35 (0.25-0.49)	0.35 (0.25-0.49)	0.35 (0.24-0.49)
VERY HIGH ($\geq 98^{\text{TH}}$ %ILE)	1.60	1.61	0.60 (0.29-1.25)	0.66 (0.32-1.38)	3.41	0.99	0.31 (0.15-0.63)	0.32 (0.15-0.66)	0.35 (0.17-0.72)
CONTINUOUS VARIABLE (\bar{X} , SD)	46.78 (8.39)	43.43 (10.02)	0.96 (0.95-0.97)	0.96 (0.95-0.97)	48.51 (7.81)	41.65 (10.19)	0.92 (0.91-0.93)	0.92 (0.91-0.93)	0.92 (0.91-0.93)

Note: Emboldened metrics denote significant differences ($p < .05$).

Adjust 1: Adjusting for age, gender, nationality, cultural background and urbanicity, family history of mental disorder, child psychopathology and exposure to three or more stressful life events.

Adjust 2: Adjusting for age, gender, nationality, cultural background, urbanicity, family history of mental disorder, child and adolescent psychopathology, exposure to three or more stressful life events.

Adjust 3: Adjusting for age, gender, nationality, cultural background, urbanicity, family history of mental disorder, child and adolescent psychopathology, exposure to three or more stressful life events and childhood self-concept.

Table 3. The Prevalence and Odds ratios of the change in self-concept score by adolescence for children who reported low, average and high self-concept in childhood.

CHANGE IN SELF-CONCEPT BY ADOLESCENCE	CONTROLS %	PES %	ODDS RATIO (CI)	ADJUST 1 ODDS RATIO (CI)
LOW SELF-CONCEPT IN CHILDHOOD	N = 1,659	N = 367		
REMAINED LOW	37.86	62.93	Ref	Ref
IMPROVED AVERAGE	44.26	31.72	0.43 (0.33-0.55)	0.47 (0.36-0.61)
IMPROVED TO HIGH	17.88	5.35	0.18 (0.11-0.29)	0.22 (0.13-0.37)
AVERAGE SELF CONCEPT IN CHILDHOOD	N = 2,498	N= 322		
DROPPED TO LOW	24.07	57.86	3.74 (2.87-4.87)	3.67 (2.80-4.80)
REMAINED AVERAGE	46.65	29.98	Ref	Ref
IMPROVED TO HIGH	29.28	12.16	0.64 (0.44-0.94)	0.65 (0.44-0.96)
HIGH SELF CONCEPT IN CHILDHOOD	N= 1,604	N= 164		
DROPPED TO LOW	13.63	33.47	5.72 (3.62-9.04)	5.95 (3.72-9.53)
DROPPED TO AVERAGE	39.58	46.47	2.73 (1.79-4.17)	2.74 (1.78-4.22)
REMAINED HIGH	46.79	20.06	Ref	Ref

Note: Emboldened metrics denote significant differences ($p < .05$).

Adjustment 1: Adjusting for age, gender, nationality, cultural background, urbanicity, family history of mental disorder, child and adolescent psychopathology, exposure to three or more stressful life events.

Table 4. Odds ratios of the change in self-concept subscale category by adolescence for children who reported poor, average and high scores in childhood.

CHANGE IN SELF-CONCEPT BY ADOLESCENCE		HAPPINESS OR (CI)	POPULARITY OR (CI)	ANXIETY OR (CI)	BEHAVIOUR OR (CI)	INTELLECT OR (CI)	PHYSICAL OR (CI)
LOW IN CHILDHOOD							
Adolescent Category	Low	-	-	-	-	-	-
	Average	0.61 (0.43-0.87)	0.59 (0.43-0.80)	0.72 (0.52-0.99)	0.52 (0.38-0.72)	0.72 (0.53-0.97)	1.77 (1.24-2.52)
	High	0.63 (0.42-0.94)	0.50 (0.28-0.88)	0.30 (0.18-0.50)	0.30 (0.21-0.43)	1.00 (0.62-1.60)	2.31 (1.32-4.01)
AVERAGE IN CHILDHOOD							
Adolescent Category	Low	2.02 (1.33-3.29)	1.54 (1.17-2.02)	1.93 (1.38-2.72)	1.59 (1.15-2.21)	0.94 (0.68-1.28)	0.56 (0.39-0.80)
	Average	-	-	-	-	-	-
	High	1.54 (0.96-2.47)	0.84 (0.59-1.26)	0.64 (0.43-0.95)	0.62 (0.44-0.87)	0.98 (0.67-1.43)	1.30 (0.80-2.01)
HIGH IN CHILDHOOD							
Adolescent Category	Low	1.31 (0.87-1.97)	3.27 (1.72-6.22)	1.44 (0.88-2.37)	1.86 (1.18-2.93)	3.10 (1.70-5.64)	0.61 (0.31-1.22)
	Average	1.61 (1.13-2.29)	1.53 (0.88-2.63)	1.22 (0.84-1.78)	1.18 (0.74-1.89)	1.94 (1.18-3.20)	0.91 (0.57-1.44)
	High	-	-	-	-	-	-

Note: Emboldened metrics denote significant differences ($p < .05$). Subscale titles: Happiness = Happiness and Satisfaction; Popularity = Popularity; Anxiety = Freedom from Anxiety; Behaviour = Behavioural Adjustment; Intellect = Intelligence and School Status; and Physical = Physical Appearance and Attributes;

Adjustment 1: Adjusting for age, gender, nationality, cultural background, urbanicity, family history of mental disorder, child and adolescent psychopathology, exposure to three or more stressful life events and all other subscales categories during adolescence