Social Isolation and Mental Health at Primary and Secondary School Entry: A Longitudinal Cohort Study

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Objective: We tested whether children who are socially isolated early in their schooling develop mental health problems in early adolescence, taking into account their mental health and family risk at school entry.

Method: We used data from the Environmental Risk (E-Risk) Longitudinal Twin Study, a birth cohort of 2,232 children born in England and Wales in 1994 and 1995. We measured social isolation using mothers' and teachers' reports at ages 5 and 12 years. We assessed mental health symptoms via mothers' and teachers' ratings at age 5 and self-report measures at age 12. We collected mother-reported information about the family environment when children were 5 years old. We conducted regression analyses to test concurrent and longitudinal associations between early family factors, social isolation, and mental health difficulties.

Results: At both primary and secondary school, children who were socially isolated experienced greater mental health difficulties. Children with behavioral problems or attention-deficit/hyperactivity disorder (ADHD) symptoms at age 5 years had an elevated risk of becoming more socially isolated at age 12. However, children who were isolated at age 5 did not have greater mental health symptoms at age 12, over and above pre-existing difficulties.

Conclusion: Although social isolation and mental health problems co-occur in childhood, early isolation does not predict worse mental health problems later on. However, children who exhibit problematic behaviors may struggle to cope with the social challenges that accompany their progression through the early school years.

Key Words: social isolation, peer relationships, child development, behavioral problems, ADHD

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Intimacy and belongingness are intrinsic human needs.[1] Interpersonal connections offer many benefits; they provide a frame of reference for social identity, as well as being a source of support and relief in times of stress.[2] Relationships may be particularly important in childhood, when identity is developing and lifetime trajectories of emotional and behavioral problems are taking shape.[3,4] To the extent that positive social relationships are rewarding and desirable, the absence or loss of such relationships may be detrimental to individuals' well-being. Furthermore, children with emotional or behavioral disorders could experience difficulties integrating in social environments. The aim of this study was to examine the associations between social isolation and mental health difficulties at primary and secondary school entry, 2 important transitions in children's lives and key periods for the formation of social connections.

The majority of studies on social isolation have focused on the latter years of life, when bereavement becomes more common and declining health imposes limitations on social activities. It is also at this stage of life that the long-term impact of social isolation is most evident: isolation in middle to late adulthood is associated with an increased risk of mortality that is comparable to the risks associated with smoking.[5,6] A number of mechanisms have been proposed to explain how the distressing experience of social isolation negatively affects health, including altered cardiovascular activity,[7,8] increased activation of the hypothalamic–pituitary–adrenocortical axis,[9,10] inflammation,[11,12] and less restorative sleep.[13,14]

Although the health outcomes of social isolation have been extensively studied in adults, there is increasing evidence from longitudinal studies that these long-term effects have their origins much earlier in life. Findings from a birth cohort study in New Zealand show that social isolation measured in childhood is associated with an increased risk of depression, high inflammation levels, and other markers of cardiovascular disease in adulthood.[12] Furthermore, multiple periods of isolation from childhood to adulthood predict poorer adult health outcomes in a dose–response manner.[15] This underscores the importance of early intervention to forestall the long-term effects of social isolation, and indicates a need for research to examine this phenomenon from a developmental perspective. Moreover, it is unclear how isolation emerges and persists in childhood. Understanding the role of isolation for children's development may provide clues as to how it exerts an effect on adult health outcomes.

Research on childhood social isolation has typically focused on the school environment,[16-23] as it is in this context that children acquire many of their early social experiences and develop peer relationships. This socializing process can be hindered in different ways; for instance, children may experience rejection by classmates, or they may themselves withdraw from social activities, in both cases consigning

them to the margins of their peer groups. These isolating experiences may in turn have an impact on mental health. Studies of peer acceptance indicate that rejected children go on to show increases in externalizing problems,[16,19-21] whereas childhood withdrawal is associated with later symptoms of depression and anxiety.[18,24] However, the relationship between isolation and later psychopathology may not be straightforward. Pre-existing mental health difficulties could play a role, and social isolation may itself be a dynamic phenomenon that co-occurs with poor mental health without necessarily predicting a worsening of mental health symptoms over time. To comprehensively understand the relationship between isolation and mental health, it is important to consider both cross-sectional and bidirectional associations across time.

The onset of adolescence may be particularly challenging for children who did not successfully socialize in their early years of schooling. The transition to secondary school signals a period of upheaval, requiring children to adapt to a larger and unfamiliar social environment. Peer relationships become more complex and nuanced in adolescence,[25] and solitary behavior could come to be perceived more negatively.[26] Friendships and interactions with peers provide children with cues from which they can learn etiquette and social norms; therefore, children who are excluded from social interactions in the early years may fail to acquire these skills sufficiently, and go on to display more problematic behavior later in their schooling. However, it is also possible that pre-existing emotional or behavioral problems can alienate children from friendship groups and activities, and thus predict increases in social isolation over time. If this is the case, the association between social isolation and later adjustment outcomes could be largely accounted for by the continuity of these pre-existing problems.

In the present study, we investigated the developmental associations between social isolation and mental health difficulties (emotional problems, behavioral problems, and attention-deficit/hyperactivity disorder [ADHD] symptoms) at ages 5 years and 12 years in a longitudinal, nationally representative cohort of children living in the United Kingdom. First, we tested for concurrent associations between social isolation and mental health difficulties at both ages. Second, we examined bidirectional associations between social isolation and emotional or behavioral problems over time. We controlled for family factors when testing the associations between social isolation and mental health because factors in the family environment such as low socioeconomic status (SES)[27] and physical maltreatment[28] could also make children more vulnerable to social isolation.

METHOD

Study Participants

Participants were members of the Environmental Risk (E-Risk) Longitudinal Twin Study, which tracks the development of a birth cohort of 2,232 British children. The sample was drawn from a larger birth register of twins born in England and Wales in 1994 and 1995.[29] Full details about the sample are reported elsewhere.[30] Briefly, the E-Risk sample was constructed in 1999 and 2000, when 1,116 families with same-sex 5-year-old twins (93% of those eligible) participated in home visit assessments. Families were recruited to represent the UK population of families with newborns in the 1990s, based on residential location throughout England and Wales, and on mother's age (i.e., older mothers having twins via assisted reproduction were underselected, and teenage mothers with twins were overselected). We used this sampling to replace high-risk families who were selectively lost to the register via nonresponse and to ensure sufficient numbers of children growing up in high-risk environments. Follow-up home visits were conducted when these children were aged 7 years (98% participation), 10 years (96%), and 12 years (96%). Parents gave informed consent, and children gave assent. Ethical approval was granted by the Joint South London and Maudsley and the Institute of Psychiatry National Health Service (NHS) Ethics Committee.

Childhood Social Isolation

We measured social isolation using 6 items from the Children's Behavior Checklist (CBCL)[31] and the matching 6 items from the Teacher's Report Form (TRF).[32] The selected items were "complains of loneliness," "doesn't get along with other children [pupils]," "feels or complains that no-one loves him/her," "would rather be alone than with others," "not liked by other children [pupils]," and "withdrawn, doesn't get involved with others." Mothers completed the questionnaire in a face-to-face interview when children were aged 5 and 12 years, and teachers responded by post. For each respondent, items were summed to create 2 social isolation scales at each age. The mother and teacher scales were moderately correlated both at age 5 years ($r = 0.27$) and at age 12 ($r = 0.31$). This level of agreement is consistent with previous findings of parent and teacher ratings of children's behavior and may be partly accounted for by situational specificity[33]; hence we averaged mothers' and teachers' reports to integrate observations both in the classroom environment and outside of school. Cronbach's α for the combined scale was 0.68 at age 5 years and 0.78 at age 12. To test the genetic contributions to children's isolation, we used structural equation modeling in OpenMx[34] to decompose the variance in social isolation into additive genetic, shared environment, and non–shared environment factors.[35] The best-fitting models indicated that 53% of the variance in social isolation at age 5 years and 41% at age 12 were explained by genetic factors.

We created a categorical social isolation variable to identify 3 groups of children. We classified children with scores of ≤ 1 as "low" isolated, those with scores >1 and ≤ 2 as "moderate," and those with scores >2 as "high." At age 5 years, 9% of children were highly isolated and 14% were moderately isolated. At age 12 years, 12% of children were highly isolated and 14% moderately isolated. The continuity of social isolation across age points was tested using the κ statistic, indicating slight stability between ages 5 and 12 ($\kappa = 0.17$, $p < .001$).

Measures of family factors and mental health problems are described in Table 1. Four of the items used to construct the social isolation measure are included in the emotional problems subscales of the CBCL and TRF; these items were therefore omitted when deriving the emotional problems scale.

Statistical Analyses

We examined associations between family factors and social isolation using a series of multinomial logistic regressions. We entered family factors into separate univariate regressions, first with social isolation at age 5 and second at age 12 as the dependent variable. As all family factors were significantly associated with social isolation at both age points, we then analyzed them simultaneously in