

# **Title: Studying Adolescent Social Isolation in School-based Social Networks: Implications for Health Research**

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## **Abstract**

In a systematic review by Collonnaz *et al* (2024) the authors provide a comprehensive overview of how social isolation has been defined and measured in adolescent health behaviour research. The review focuses on studies that use peer nomination data and social network analysis within school settings. They identify 14 different ways that social isolation has been defined in the literature and argue the need for future research to identify the “best measure of social isolation” and reach consensus on its meaning. However, we argue that there is no "best" measure, as social isolation is multifaceted. This is because peer nomination data can reflect different forms of social isolation - such as having no connections at all, receiving, but not sending nominations, or sending, but not receiving nominations. Evidence suggests these subtypes may reflect distinct social processes and relate to health outcomes differently. Therefore, these measures warrant separate consideration and research. We discuss how choosing only one measure would occlude important links to adolescent health and how inconsistent measures of isolation hinder our ability to synthesise and compare evidence across studies.

## **Commentary**

Adolescent peer relationships matter profoundly for mental and physical health [1,2]. Social isolation from peers (i.e., a lack of connection) is associated with increased risk of mental health problems and adverse health outcomes like substance use [3–5], with evidence of downstream consequences on cardiovascular and metabolic health [6]. School-based social network studies - where adolescents nominate their peer-friendships and social network analysis can be used to objectively map out their peer-friendship networks - are an increasingly popular method for studying social isolation from peers [7]. This method can provide an objective measure of isolation from the wider peer group (i.e., identifying those that are not connected) that is distinct from perceived isolation or loneliness [7,8].

However, the systematic review by Collonnaz *et al* identified considerable variation in how social isolation is defined and conceptualised across network studies that use peer nomination methods in schools [9]. Some studies define it as having no friends at all, or just a few, while others consider more nuanced patterns of disconnection with peers, such as an absence of sent *only* or absence of received *only* nominations, to be distinct subtypes [3,10]. They also suggest “*further research is needed to recommend the best measure of social isolation*”.

However, increasingly, evidence shows that these different subtypes may represent unique qualitative experiences with distinct health implications [3]. Thus, we argue that there is no one best measure - social isolation *is* multi-dimensional. Yet, inconsistency in how social isolation is defined and reported in network studies limits our ability to synthesise evidence and obscures important links to adolescent health.

Specifically, Collonnaz *et al.* found there were 14 different ways that social isolation has been defined in the adolescent health and social network literature [9]. For example, some defined it as “*adolescents who send and receive no friendship nominations at all*” within their school network and can be considered, in network term, “total isolates”. Others defined it as “*adolescents with no more than one reciprocated friendship nomination*” or based definitions on the absence of received *only* (i.e., in-degree isolate as termed in the network literature) vs. sent *only* friendship nominations (i.e., out-degree isolate). In addition to their work, we highlight that some studies use definitions that mix both objective peer nomination information with other contextual or self-report measures to create further typologies of social isolation. For example, considering whether an adolescent is a “total isolate” from their peer network (via peer nomination data) but *also* self-reports that they have problems with their peers, which researchers have labelled “*peer-troubled isolates*” [4]. Or, considering whether adolescents self-report that they have friends outside of the school network, which other researchers have labelled “*outside oriented*” [3]. When information beyond peer nomination data is added into definitions of isolation, the meaning becomes further augmented and qualitatively unique.

This inconsistency in what we mean by isolation creates two inter-related problems. First, different isolation types may represent qualitatively different experiences which have distinct links with health outcomes. For example, while “total isolates” may be the most extreme and objective form of disconnection from peers, researchers have shown that the absence of incoming friendship nominations versus the absence of outgoing friendship nominations in school networks may have different associations with youth health outcomes [3,10–12].

One example is Copeland *et al* who examined how these sub-types of isolation were associated with substance-use (cigarette, alcohol and marijuana use) among 9<sup>th</sup> grade students in the US [3]. They found that an absence of incoming friendship nominations (which they term “unliked isolates”) was associated with decreased alcohol consumption in youth, whereas an absence of out-going nominations (which they term “disengaged isolates”) as well as those who also had friends outside the peer-network (“outside oriented”), were linked to increased use of all three substances. A second example is Jang and Park who found that an absence of incoming friendship nominations was associated with higher levels of physical activity, relative to those who did not send friendship nominations, yet feelings of loneliness were not associated with activity [12]. Both examples are cross-sectional, but together they show that the different forms of isolation one can experience in peer networks may have distinct and separable impacts on health. Within this expanding literature, some studies have also examined the dynamic associations between isolation sub-types and smoking behaviour [11], further suggesting that these dimensions should be considered separately [11]. Although further longitudinal research is needed to establish causal and

independent effects on health outcomes, this growing evidence base underscores the importance of treating isolation as multifaceted.

Second, clustering various definitions of isolation together, makes it hard to synthesise evidence across network studies and limits our ability draw conclusions about how social isolation relates to adolescent health. Indeed, some systematic reviews report “mixed findings” for social isolation and mental health outcomes, which likely reflects the pooling of inconsistent measures together, occluding meaningful associations with outcomes of interest [5]. Clearly, there is a need for more accurate and consistent reporting of isolation in network studies and a need for more validation studies examining whether different measures capture distinct constructs and how they relate to health outcomes. Collonnaz *et al* suggest a typology - such as Type 1 isolates (adolescents with no friendship nominations), Type 2 (at most one friend) and so on. However, even “one friend” does not clarify the directionality, or reciprocity, of the friendship nomination. As shown above and highlighted by other researchers [3], this is a crucial distinction with directed peer nomination data.

Building on the Collonnaz review, we propose additional considerations for future network research. First, researchers should treat social isolation as an umbrella term in school-based network studies, reflecting its multidimensional nature, and reserve “isolate” for individuals who neither send nor receive any friendship nominations. Second, measurement choices should align with study aims. Different forms of isolation - such as lacking any sent or received nominations or, receiving, but not sending nominations, and vice-versa - may reflect distinct social processes and should be studied accordingly. In line with this, careful consideration is needed when combining peer-nomination data with other self-report measures and what these combined measures capture. Third, longitudinal research that can support the presence of causal and independent effects, and considers stability of these positions (e.g., chronic versus transient isolation), is needed. Fourth, systematic reviews and meta-analyses should avoid pooling studies that use different measures of isolation, as this limits the ability to draw meaningful conclusions.

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