

Invited Letter Rejoinder

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Adolescent internet use and symptoms of depression: a rejoinder

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We appreciate the opportunity to respond to Setyorini and Saputra's correspondence on our paper entitled *Is Adolescent Internet use a Risk Factor for The Development of Depression Symptoms or Vice-Versa?* Our study examined how adolescent internet use contributes to symptoms of depression longitudinally across the ages of 13, 15, and 17. Our results indicated that greater internet use is associated with later within-person changes in depression symptoms. These associations were present for girls, but not boys. Furthermore, the reverse association was not observed. That is, adolescents' symptoms of depression did not forecast higher levels of internet use. Setyorini and Saputra's correspondence describes several limitations of our study, including: (1) the exclusion of family dynamics and socio-economic status as control variables and (2) limited generalizability. In the following letter, I wish to respond to these comments.

We agree that depression is a complex biopsychosocial disorder with both internal and external factors playing a role. Our decision to exclude family and socioeconomic control variables is based on our choice of statistical model. In the present study, our analytic strategy involved using random intercept cross-lagged panel models (RI-CLPM) to examine within-individual change in adolescent girls' and boys' depression symptoms, as a function of their internet use (Hamaker, Kuiper, & Grasman, 2015). An important strength of modeling within-person change is that each person serves as their own-baseline control, removing the need to control for family and socioeconomic characteristics, which typically show important variation at the *between-person* level. Another important strength RI-CLPM's is their ability to take into account possible bidirectional associations. This is an important contribution since poor adolescent mental health could be a *cause* of youth's decision to spend time online. That is, depressed youth may choose to spend more time online as a form of coping, or to avoid unpleasant thoughts or feelings (Karddefelt-Winther, 2014). Indeed, a recent report from the US surgeon general recommends that research systematically document bi-directional associations between media use and mental health (Office of the Surgeon General, 2023).

Last, in terms of the generalizability of the present study, our results were based on a population-based, representative random-stratified sample of children born in the province of Quebec Canada between 1998 and 1999. The province of Quebec, Canada features a distinctive linguistic and culture profile (e.g. the majority of the Quebec population speaks French). This province also tends to implement a more generous pattern of investment in social programming. For example, transfer payments from the government help ensure greater access to affordable high-quality daycare and generous parental leave programs. Despite these features, Quebec shares many sociodemographic similarities with other Canadian provinces, the United States, western Europe, New Zealand, and Australia. As such, we believe the current findings are generalizable to other high-income countries. We agree that our results warrant replications with more vulnerable populations living in high-income countries and samples living in lower- and middle-income countries.

A second obstacle to generalizability is the constant renewal of social media platforms. For instance, since 2015 the popularity of Facebook has dropped among youth, while TikTok, Snapchat, and Instagram have risen in popularity (Pew Research Center, 2022). Despite differences in platform design and user interface, research suggests that *social reward learning* mechanisms are common to most popular platforms and are likely to explain some of the negative consequences of social media use on mental health (Lindström et al., 2021). Providing social rewards (e.g. receiving a like on a picture or video) is an effective strategy for maintaining user engagement, and thus for monetizing platform usage. As such, to the extent that current and future iterations of social media platforms continue to use social rewards to maintain user engagement, we may expect similar impacts on user mental health.

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