ENVIRONMENTAL-RISK (E-RISK) LONGITUDINAL TWIN STUDY
CONCEPT PAPER FORM

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Provisional Paper Title: Loneliness, social media use and online experiences in young adults

Date: 08 December 2021

Objective of the study and its significance:

Lonelier young people are more likely to use digital technology in compulsive or maladaptive ways (Matthews et al, 2019). However, to infer a straightforward linear association between greater technology use and feelings of loneliness may be an oversimplification. Instead, the literature indicates that the role of technology use in loneliness depends on why, and for what purpose, it is used: individuals who use social media to build social connection and enhance offline relationships experience reductions in loneliness, while increases are observed in those who use it as a coping mechanism or passively scroll through their news feeds (Berryman et al, 2018; Teppers et al, 2014). Moreover, while it is assumed that technology habits influence people's feelings of loneliness, a prior history of loneliness could shape how individuals approach technology in the first place.

However, research has often used 'social media' (and, similarly, 'screen time') as a blanket term, without consideration of how the various social media platforms differ in their dynamics. Early platforms such as Myspace and Facebook placed an emphasis on connecting with friends and cataloguing shared activities; more recent platforms such as Instagram and TikTok have placed emphasis on the individual user cultivating a personal 'brand' or 'aesthetic' before an audience, with attendant pressures to impress and live up to expectations. As such, 4 hours speaking to friends on Facebook could have quite different implications for loneliness compared to 4 hours spent trying to perfect an Instagram shot. **In this study, we are able to look at associations between young adults' levels of reported loneliness and their engagement with different types of social media and online activities. We are also uniquely positioned to ask whether prior levels of loneliness, as measured across childhood and into adolescence, predict different types of online engagement and social media use.**

The types of encounters people have with others online may also be an important determinant of how use of technology impacts feelings of loneliness. In previous research we have identified 'cybervictimization' as a risk factor for young adult loneliness (Matthews, 2020). Indeed, offline risks are the strongest predictors of online risks, including experiencing online harassment (George & Odgers, 2015; Odgers et al, 2020). Cybervictimization is a broad category, that can include threats, humiliation, sexual harassment and invasion of privacy, and it can also have consequences that spill out into offline life. A detailed examination of what particular types of online encounters are particularly salient for loneliness is warranted. **In this study we ask whether individuals who have experienced prior and/or current episodes of loneliness are at increased risk for cybervictimization and online harassment in young adulthood and whether loneliness is a unique predictor of these online risks (above other forms of psychopathology, such as depression and anxiety, for example).**

The lockdowns imposed by the UK government in response to COVID-19 created an unprecedented scenario in which virtually *all* social contact beyond one's own household was moved onto digital platforms. This was a critical test of technology's ability (or inadequacy) to satisfy the social needs of the population. Although it was arguably a vital lifeline, it was also argued that technology could not adequately replace the richness of face-to-face contact and physical touch, and that this would be felt acutely as lockdowns persisted. Moreover, patterns of social media use that are strongly associated with loneliness in 'normal' times may have become even more so during the pandemic. This could be particularly true on platforms which became breeding grounds for conspiracy theorist communities, as these may have been particularly alluring to individuals already feeling alienated and wishing for a sense of belonging. **In this study, we ask whether the associations between loneliness and online experiences differ before versus during the COVD-19 pandemic.**

The proposed study seeks to address the following research questions:
1. Is loneliness (both current and past episodes) associated with specific patterns of social media use?
2. Is loneliness associated with more positive or negative online encounters?
3. Did the associations between loneliness and online experiences differ under lockdown conditions compared to pre-pandemic times? (And does past history of loneliness predict these differences?)

Data will be drawn from the Social Media and Social Mobility (SM2) study, an online survey of the E-Risk cohort conducted between 2019 and 2020 when participants were aged 25-26. 73% (N = 1,632) of the original E-Risk sample completed the survey. The COVID-19 pandemic began midway through data collection, with 40% of surveys completed after the introduction of lockdown measures in March 2020. The measure of loneliness from the age-18 E-Risk assessment, which also appears in the SM2 survey, will be used to capture prior history of loneliness in study members.

Statistical analyses:

1. Is loneliness associated with specific patterns of social media use?

Linear regression models will be used to test whether greater feelings of loneliness are associated with (a) greater or less use of specific social media platforms; (b) emotional states attributed to use of social media; (c) adaptive vs maladaptive uses of social media. These associations will be assessed concurrently in the SM2 survey, and also longitudinally using the age-18 measure of loneliness.

2. Is loneliness associated with more positive or negative online encounters?

We will test whether lonelier individuals are more or less likely to have had negative encounters with others online (e.g. threats, sexual harassment, and incidents that had negative consequences for their offline lives.) As with aim 1, both concurrent and past loneliness will be examined in the context of these analyses.

3. Did the associations between loneliness and online experiences differ under lockdown conditions compared to pre-pandemic times?

The sample will be divided into two subgroups: the 'pre-pandemic' sample, and the 'pandemic' sample. The latter will be defined as all participants who completed the survey on or after 23 March 2020 (the first day of full lockdown in the UK). We will then enter group membership as a moderating variable in each of the analyses tested in steps (1) and (2). Analyses will be adjusted for any differences between the groups pre versus post lockdown that may have resulted from "lower risk" individuals completing the survey first (pre-lock-down) and more "hard to reach" participants completing the survey during the lockdown.

Sensitivity analyses.

The SM2 survey concluded on 18 October 2020. It should be noted that lockdown measures were incrementally eased before this date. Key milestones were the reopening of hospitality venues on 4 July, and the introduction of the 'rule of six' on 14 September. 40% and 13% respectively of the 'pandemic' sample completed their surveys after these dates, and therefore cannot be considered to have done so under full lockdown conditions. Therefore, for the purpose of sensitivity analyses, associations will be tested with these groups omitted.

Variables Needed at Which Ages (names and labels):

E-RISK

Age 5:
FAMILYID ID Family
ATWINID ID Twin 1
BTWINID ID Twin 2
SAMPSEX Sex of twins
SESWQ35 Social Class Composite

+ IMD Variables (for sample description)

Age 12:
lonelye12 Loneliness age 12

Age 18:
Lonelye18 Loneliness age 18
Dxmdee18 Depression age 18
Dxgade18 Anxiety age 18
Teche18 Technology use age 18

SM2 survey responses on loneliness and social media use.

References:

Berryman, C., Ferguson, C. J., & Negy, C. (2018). Social media use and mental health among young adults. *Psychiatric Quarterly, 89,* 307-314.

George, M., & Odgers, CL. (2015). Seven fears and the science of how mobile technologies may be influencing adolescents in the digital age. Perspectives on Psychological Science, 10, 832-851.

Matthews, T., Caspi, A., Danese, A., Fisher, H. L., Moffitt, T. E., & Arseneault, L. (2020). A longitudinal twin study of victimization and loneliness from childhood to young adulthood. *Development and Psychopathology*. doi:10.1017/S0954579420001005

Matthews, T., Danese, A., Caspi, A., Fisher, H. L., Goldman-Mellor, S., Kepa, A., Moffitt, T. E., Odgers, C. L., & Arseneault, L. (2019). Lonely young adults in modern Britain: findings from an epidemiological cohort study. *Psychological Medicine, 49*(2), 268-277.

Odgers, CL, Schueller, SM, & Ito, M. (2020). Screen time, social media use, and adolescent development. Annual Review of Developmental Psychology, 2, 485-502.

Teppers, E., Luyckx, K., Klimstra, T. A., & Goossens, L. (2014). Loneliness and Facebook motives in adolescence: a longitudinal inquiry into directionality of effect. *Journal of Adolescence, 37*(5), 691-699.

Data Security Agreement

Provisional Paper Title	The developmental course of loneliness from childhood to young adulthood
Proposing Author	Timothy Matthews
Today's Date	8 December 2021

Please keep one copy for your records
(Please initial your agreement)

TM   I am familiar with the King's College London research ethics guidelines (https://www.kcl.ac.uk/innovation/research/support/ethics/about/index.aspx) and the MRC good research practice guidelines (https://www.mrc.ac.uk/research/policies-and-guidance-for-researchers/good-research-practice/).

TM   My project has ethical approval from my institution.

TM   I am familiar with the EU General Data Protection Regulation (https://mrc.ukri.org/documents/pdf/gdpr-guidance-note-3-consent-in-research-and-confidentiality/), and will use the data in a manner compliant with its requirements.

TM   My computer is (a) encrypted at the hard drive level, (b) password-protected, (c) configured to lock after 15 minutes of inactivity, AND (d) has an antivirus client which is updated regularly.

TM   I will treat all data as "restricted" and store in a secure fashion.

TM   I will not share the data with anyone, including students or other collaborators not specifically listed on this concept paper.

TM   I will not merge data from different files or sources, except where approval has been given by the PI.

TM   I will not post data online or submit the data file to a journal for them to post.
Some journals are now requesting the data file as part of the manuscript submission process. The E-Risk Study cannot be shared because the Study Members have not given informed consent for unrestricted open access. Speak to the study PI for strategies for dealing with data sharing requests from Journals.

TM   Before submitting my paper to a journal, I will submit my draft manuscript and scripts for data checking, and my draft manuscript for co-author mock review, allowing three weeks.

TM   I will submit analysis scripts and new variable documentation to project data manager after the manuscript gets accepted for publication.

TM   I will delete the data after the project is complete.

TM   **For projects using location data:** I will ensure geographical location information, including postcodes or geographical coordinates for the E-Risk study member's homes or schools, is <u>never</u> combined or stored with any other E-Risk data (family or twin-level data)

TM   **For projects using genomic data:** I will only use the SNP and/or 450K data in conjunction with the phenotypes that have been approved for use in this project at the concept paper stage.

Signature: *Tim Matthews*