Swiping away dullness: Disliking boredom predicts more smartphone use

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Abstract

People often turn to their smartphones when they feel bored. Considering that emotion beliefs play an important role in emotional experience and regulation, do people who strongly dislike boredom use their smartphones more often to avoid this state? The current research investigated both individual differences and intrapersonal fluctuations in a lay belief about boredom—boredom dislike—alongside experienced boredom and smartphone use. We conducted a correlational study (Study 1; $N = 495$) and a three-wave longitudinal study in which participants completed surveys every four months (Study 2; $N = 261$). Smartphone use was assessed via both self-report measure and screentime tracking. Across both studies, boredom dislike predicted not only more frequent and intense experiences of boredom but also more smartphone use. Participants who reported stronger boredom dislike also reported higher levels of excessive smartphone use. At the within-person level, occasions when participants disliked boredom more than usual were associated with longer screen time. Furthermore, boredom dislike moderated the association between boredom and smartphone use. At the between-person level, the positive associations of boredom frequency and intensity with excessive smartphone use were more salient among those who strongly disliked boredom. At the within-person level, boredom frequency positively predicted screen time only among participants low in boredom dislike; among those high in boredom dislike, screen time remained elevated regardless of boredom frequency. Overall, our findings suggest that an aversive orientation toward boredom may motivate smartphone use. We discuss their implications for boredom coping and digital media use.

Keywords: boredom, emotion beliefs, smartphones, media use

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1. Introduction

While smartphones offer undeniable convenience and numerous benefits, extensive research has documented their detrimental effects on mental health (e.g., Sohn et al., 2019; J. Yang et al., 2020). One of the primary motivations for smartphone use is the desire to alleviate boredom (Fullwood et al., 2017; Lepp et al., 2017). Boredom has been consistently associated with increased smartphone use—especially problematic use—across meta-analytic (Camerini et al., 2023), correlational (e.g., Elhai et al., 2018; Wolniewicz et al., 2020), experimental (Barkley & Lepp, 2021; Dwyer et al., 2018) and longitudinal studies (Y. Zhang et al., 2022). While boredom appears to drive smartphone use, what role do people's *lay beliefs about boredom* play in this relationship? Accumulating evidence suggests that emotion beliefs (e.g., whether an emotion is perceived as good or bad) influence how emotions are experienced and regulated (Ford & Gross, 2018). Could it be that a strong aversion to boredom aggravates its impact on smartphone use? Conversely, are those more tolerant of boredom less likely to resort to the screens in response? The current research investigated the interplay among boredom dislike, boredom experience, and smartphone use.

1.1. Coping with Boredom

Boredom is an emotion that comes and goes (Fisher, 1993). Its experience is typically unpleasant (Smith & Ellsworth, 1985; Van Tilburg & Igou, 2017a), and features a perceived lack of meaning (e.g., Chan et al., 2018; Van Tilburg & Igou, 2012), a distracted mind (Hunter & Eastwood, 2016; Yakobi et al., 2021), and distorted time perception (Martarelli et al., 2024; Witowska et al., 2020). The experience of boredom is thought to arise from a discrepancy between one's actual and desired levels of attentional engagement (Tam, Van Tilburg, Chan, et

al., 2021). When bored, attention may shift outward, turn inwards, or return to the source of boredom. Whether boredom subsides depends on where attention settles and whether this shift successfully reduces the discrepancy. When it does not, repeated attentional shifts may result in a feedback loop, leading to intensified boredom, fluctuations in arousal, and the emergence of other negative emotions. The detrimental mental health impact of prolonged boredom is evident (e.g., Fahlman et al., 2009; Goldberg et al., 2011; Lee & Zelman, 2019). Nevertheless, this emotion is believed to serve several important functions. Boredom informs people that the current situation lacks meaning, and motivates a redirection of attention to something more satisfying, for better or worse (Bench & Lench, 2013; Van Tilburg & Igou, 2012). Its associations with a wealth of cognitive and behavioural outcomes suggest it to be a powerful instigator of changes (Wolff & Martarelli, 2020).

People employ a variety of strategies to cope with boredom. These strategies can be categorised into four main orientations, including cognitive approach, cognitive avoidance, behavioural approach, and behavioural avoidance (Nett et al., 2010). First, as a cognitive-approach strategy, people may mitigate boredom by reappraising the boring situation (Nett et al., 2010, 2011; Webster & Hadwin, 2015). For example, students may look for meaningful aspects in a tedious class to reengage their attention (Finkielsztein, 2020). Second, people may adopt cognitive-avoidance strategies and think of something else that are unrelated to the source of boredom. This includes mind-wandering (Martarelli et al., 2024), engaging in self-reflection (Lomas, 2017), retrieving nostalgic memories (Van Tilburg et al., 2013), and planning for future events (Finkielsztein, 2020). Third, behavioural-approach strategies are actions targeted at changing the boring situation. People may think of alternative, creative ways to approach a boring task (Sansone et al., 1992). Fourth, behavioural-avoidance strategies refer to actions that

are not related to the source of boredom, like using smartphones in a boring lecture or skipping the class altogether (Finkielsztein, 2020; Nakamura et al., 2021).

The list of behavioural-avoidance strategies that people have at their disposal in the face of boredom is extensive. Some of them are relatively harmless, like seeking novel experiences (Bench & Lench, 2019), socialising (Harris, 2000), and observing the environment (Finkielsztein, 2020). Others are unconstructive or even harmful (Bieleke et al., 2022), including unhealthy snacking (Havermans et al., 2015; Moynihan et al., 2015), impulse shopping (Sundström et al., 2019), risk-taking (Kılıç et al., 2020), self-administering electric shock (Havermans et al., 2015; Nederkoorn et al., 2016), and harming others for pleasure (Pfattheicher et al., 2021). Chronic boredom is associated with risky driving (Oxtoby et al., 2019), binge drinking (Biolcati et al., 2016), emotional eating (Crockett et al., 2015), and problematic internet use (Skues et al., 2016).

Boredom and digital media use are closely related (for a meta-analysis, see Camerini et al., 2023). Qualitative studies suggest that boredom relief is a primary motivation for smartphone behaviour (Fullwood et al., 2017; Lepp et al., 2017), and significantly more so among high-frequency users (Lepp et al., 2017). Extensive research indicates a positive association between boredom and excessive smartphone use (Al-Saggaf et al., 2019; Elhai et al., 2018; Ksinan et al., 2021; Wolniewicz et al., 2020; X.-J. Yang et al., 2020; L. Zhang et al., 2023). However, smartphone use appears to be an ineffective boredom coping strategy. While people turn to their smartphones when they are bored, they feel even more bored after using them (Dora et al., 2021). Experiments have shown that smartphone use can causally intensify boredom (Barkley & Lepp, 2021; Dwyer et al., 2018). A longitudinal study further reveals a bidirectional relationship between chronic boredom and excessive smartphone use, with excessive smartphone use being

the stronger predictor of chronic boredom rather than the other way around (Y. Zhang et al., 2022). Boredom drives people to fast-forward and skip online videos, and yet such behaviours intensify boredom (Tam & Inzlicht, 2024). An ineffective response to boredom not only fails to alleviate it but may exacerbate and prolong the bored experience.

1.2. Emotion Beliefs

People hold varying beliefs about emotions—whether they are good or bad, controllable or uncontrollable, useful or useless, helpful or harmful (Ford & Gross, 2018)—and these beliefs exert a pervasive influence on affective experience (Ford & Gross, 2019). For instance, liking approach-oriented emotions such as joy and anger is associated with higher trait levels of those emotions, whereas disliking withdrawal-oriented emotions such as fear and disgust is associated with higher trait levels of those emotions (Harmon-Jones et al., 2011). In experimental studies, participants who were encouraged to accept their emotions reported fewer negative affects during recovery after viewing emotion-eliciting stimuli (Campbell-Sills et al., 2006; Predatu et al., 2020). These findings suggest that emotion beliefs influence how emotions are experienced.

Moreover, beliefs about emotion shape emotion regulation processes. Ford and Gross (2018, 2019) theorise that people who believe an emotion is bad (vs. good) are more likely to see the need to regulate the emotion, select strategies that help them avoid it, and have negative feelings about experiencing that emotion. This theory is corroborated by subsequent empirical findings. In an experience-sampling study, evaluating an emotion as harmful was associated with a higher likelihood to engage in regulatory efforts, irrespective of the momentary affects (Wittkamp et al., 2022). Moreover, participants who endorsed a theory that emotion helps were more likely to use cognitive reappraisal, while those who endorsed a theory that emotion hinders tended to suppress their emotions (Karnaze & Levine, 2018). In an experiment where

participants watched an emotion-provoking film, those instructed to endorse irrational beliefs about emotions—such as refusing to allow negative emotions and viewing them as unbearable—reported more negative meta-emotions, such as feeling ashamed of experiencing negative emotions (Predatu et al., 2020).

Furthermore, people who dislike an emotion are more likely to avoid it. For instance, participants who held negative evaluations of sadness or disgust were more likely to avoid sad or disgusting stimuli (Markovitch et al., 2017). Likewise, a greater dislike of fear was associated with higher motivation to avoid fear-inducing stimuli (Harmon-Jones et al., 2011). Believing negative emotions are unacceptable was associated with more emotional avoidance (Sydenham et al., 2017).

Extrapolating from these theoretical and empirical findings, lay beliefs about boredom likely influence the way people experience boredom and respond to it. People differ in whether they recognise the functional value of boredom, how much they dislike feeling bored, and the extent to which they normalise boredom as part of everyday life (Tam, Van Tilburg, et al., 2023). In correlational and longitudinal studies (Tam, Chan, et al., 2023), young people reported more frequent and intense boredom when they disliked this emotion more, either relative to others or relative to the own usual levels. Furthermore, the association between boredom and poorer mental well-being was stronger at times when boredom was more strongly disliked. Qualitative data indicate that some people would try their best to minimise the possibility of feeling bored (Tam, Van Tilburg, et al., 2023). Such aversion to boredom may prompt people to turn to their smartphones to avoid feeling bored, regardless of whether they are actually experiencing boredom.

1.3. Current Research

The current research investigated how *boredom dislike* (i.e., a negative orientation toward boredom) relates to boredom experience and smartphone use at both the interpersonal (Study 1) and intrapersonal (Study 2) levels. Study 1 was a correlational study with a U.S. sample that tested between-person associations (i.e., individual differences) of boredom dislike, boredom experience, and excessive smartphone use. Study 2 was a three-wave longitudinal study, with assessments spaced four months apart, conducted with a Hong Kong sample. This study examined within-person associations (i.e., fluctuations across time) in boredom dislike, boredom experience, and smartphone screen time. The studies and analyses were not pre-registered. All data and analysis codes are available on the Open Science Framework (https://osf.io/sfha9/?view_only=46ce6ac580c5424bb7fb8e535aafbc1b).

Two main hypotheses were tested. First, we hypothesised that boredom dislike is positively associated with both the frequency (H1a) and intensity (H1b) of boredom. According to Ford and Gross (2018), those who believe an emotion as undesirable may more readily notice the signs of that emotion, and thus evaluate the current emotion and situation more negatively. Previous studies reveal positive associations between boredom dislike and boredom experience (Tam, Chan, et al., 2023; Tam, Van Tilburg, et al., 2023), which the present research sought to replicate.

Second, we hypothesized that boredom dislike moderates the associations between boredom and smartphone use. Specifically, boredom dislike was expected to strengthen the positive associations of boredom frequency (H2a) and intensity (H2b) with smartphone use. We propose that those who hold more negative views of boredom are more likely to use smartphones to avoid boredom. This is postulated from the theoretical proposition (Ford & Gross, 2019) and

empirical findings (Harmon-Jones et al., 2011; Markovitch et al., 2017; Sydenham et al., 2017) showing that people who believe an emotion is undesirable are more likely to regulate and reduce it.

2. Study 1

Study 1 was a correlational study that served as an initial test of our hypotheses: boredom dislike is positively associated with boredom experience (as boredom frequency and intensity; H1a & H1b), and it moderates the association between boredom experience and smartphone use (H2a & H2b). This study assessed smartphone behaviour through a self-report measure of excessive smartphone use (Kwon et al., 2013) which showed robust relationship with poorer psychological well-being (e.g., Elhai et al., 2017; Samaha & Hawi, 2016).

2.1. Method

2.1.1. Participants

We recruited Amazon's Mechanical Turk (MTurk) workers who were residing in the U.S. and had approval rates over 90%. Five-hundred and thirty-six workers completed the survey, with 41 participants excluded for failing either of the two attention checks. Our final sample size consisted of 495 Americans (46.5% female; age range = [18, 73], $M = 35.8$, $SD = 11.5$). Participants self-identified as White (68.5%), Black or African American (17.8%), Asian (7.9%), Multiracial (3.2%), American Indian or Alaska Native (1.6%), or other (1%).

2.1.2. Procedure and Measures

Data were derived from a larger project ([masked]). Participants completed an online survey with measures of boredom dislike, boredom frequency, boredom intensity, and excessive smartphone use. The boredom dislike subscale assesses the extent to which people affectively dislike boredom (e.g., "I hate being bored": 1 = *strongly disagree*, 7 = *strongly agree*; $\alpha = .70$),

and is part of the Boredom Beliefs Scale (BBS; Tam, Van Tilburg, et al., 2023). Two items were administered to measure boredom frequency ("How often have you felt bored in the last month?": 1 = *none of the time*, 9 = *all of the time*), and boredom intensity ("When you feel bored, what is your experience of it like?": 1 = *very mild*, 9 = *very intense*) (Tam, Van Tilburg, & Chan, 2021). Boredom frequency and intensity have been identified as key characterizations of boredom proneness (Tam, Van Tilburg, & Chan, 2021) which is defined as "the tendency towards experiencing boredom" (Farmer & Sundberg, 1986, p. 14). Excessive smartphone use was measured with the 10-item Smartphone Addiction Scale - Short Version for Adolescents (SAS-SV; Kwon et al., 2013). Sample items include "Feeling impatient and fretful when I am not holding my smartphone," and "Won't be able to stand not having a smartphone." All responses were made on a 6-point scale (1 = *strongly disagree*, 6 = *strongly agree*), with higher total scores indicating higher levels of excessive smartphone use ($\alpha = .95$).

2.1.3. Data Analysis

We examined the bivariate correlations between boredom dislike, boredom frequency and boredom intensity to test Hypothesis 1. For Hypothesis 2, regression analyses were conducted to test whether excessive smartphone use was predicted by boredom dislike, boredom frequency (or boredom intensity), and their interaction term. All the predictors were mean-centered. We used simple slopes analysis to probe significant interactions.

2.2. Results

Descriptive statistics and correlations of the measured variables are presented in Table 1. Supporting Hypothesis 1, boredom dislike was positively associated with boredom frequency, $r = .50$, $p < .001$ (H1a), and intensity, $r = .53$, $p < .001$ (H1b). We also found a positive association between boredom dislike and excessive smartphone use, $r = .53$, $p < .001$.

Table 1

Means, Standard Deviations, and Correlations of the Measured Variables in Studies 1 and 2

	Mean	*SD*	1	2	3
Study 1 (N = 495)					
1. Boredom dislike	4.39	1.45	-		
2. Boredom frequency	5.27	2.22	.50***	-	
3. Boredom intensity	5.12	2.28	.53***	.72***	-
4. Excessive smartphone use	30.11	14.10	.53***	.54***	.56***
Study 2 (N = 261)					
1. Boredom dislike	4.10	1.27	-		
2. Boredom frequency	5.53	1.71	.46***	-	
3. Boredom intensity	4.70	1.71	.46***	.68***	-
4. Screen time (in min)	353.53	154.53	-.09	.04	-.06

Note. Means, standard deviations, and correlations for Study 2 are those of aggregated mean scores of participants.

*** $p < .001$.

In a regression model (H2a), excessive smartphone use was predicted by boredom dislike (B = 3.44, SE = .39, β = .35, $p < .001$), boredom frequency (B = 2.32, SE = .26, β = .36, $p < .001$), and their interaction term (B = 0.39, SE = .16, β = .085, p = .016). Overall, the regression model explained variance in excessive smartphone use, *Adjusted* R^2 =.39, $F(3, 490) = 106.6$, $p < .001$. A simple slopes analysis revealed that boredom frequency significantly predicted excessive smartphone use in both high (+1 SD above the mean) level of boredom dislike, B = 2.88, SE = .34, $p < .001$, and low (-1 SD below the mean) level of boredom dislike, B = 1.76, SE

= .35, $p < .001$ (Figure 1; H2a). This association was stronger among participants with a higher level of boredom dislike, as indicated by a significant difference between the two slopes, B = -1.12, SE = .46, p = .016.

In another regression model (H2b), excessive smartphone use was also predicted by boredom dislike (B = 3.29, SE = .40, β = .34, $p < .001$), boredom intensity (B = 2.37, SE = .25, β = .38, $p < .001$) and their interaction term (B = 0.58, SE = .15, β = .13, $p < .001$). The regression model explained variance in excessive smartphone use, *Adjusted* R^2 =.41, $F(3, 490) = 114.6$, $p < .001$. A simple slopes analysis revealed that boredom intensity was a significant predictor of excessive smartphone use in high (+1 SD above the mean) level of boredom dislike, B = 3.21, SE = .33, $p < .001$, and in low (-1 SD below the mean) level of boredom dislike, B = 1.54, SE = .34, $p < .001$ (Figure 2; H2b). This association was stronger among participants with a higher level of boredom dislike, as indicated by a significant difference between the two slopes, B = 1.67, SE = .44, $p < .001$.

Figure 1

Simple Slopes for Between-person Associations of Boredom Dislike and Boredom Frequency in the Prediction of Excessive Smartphone Use in Study 1

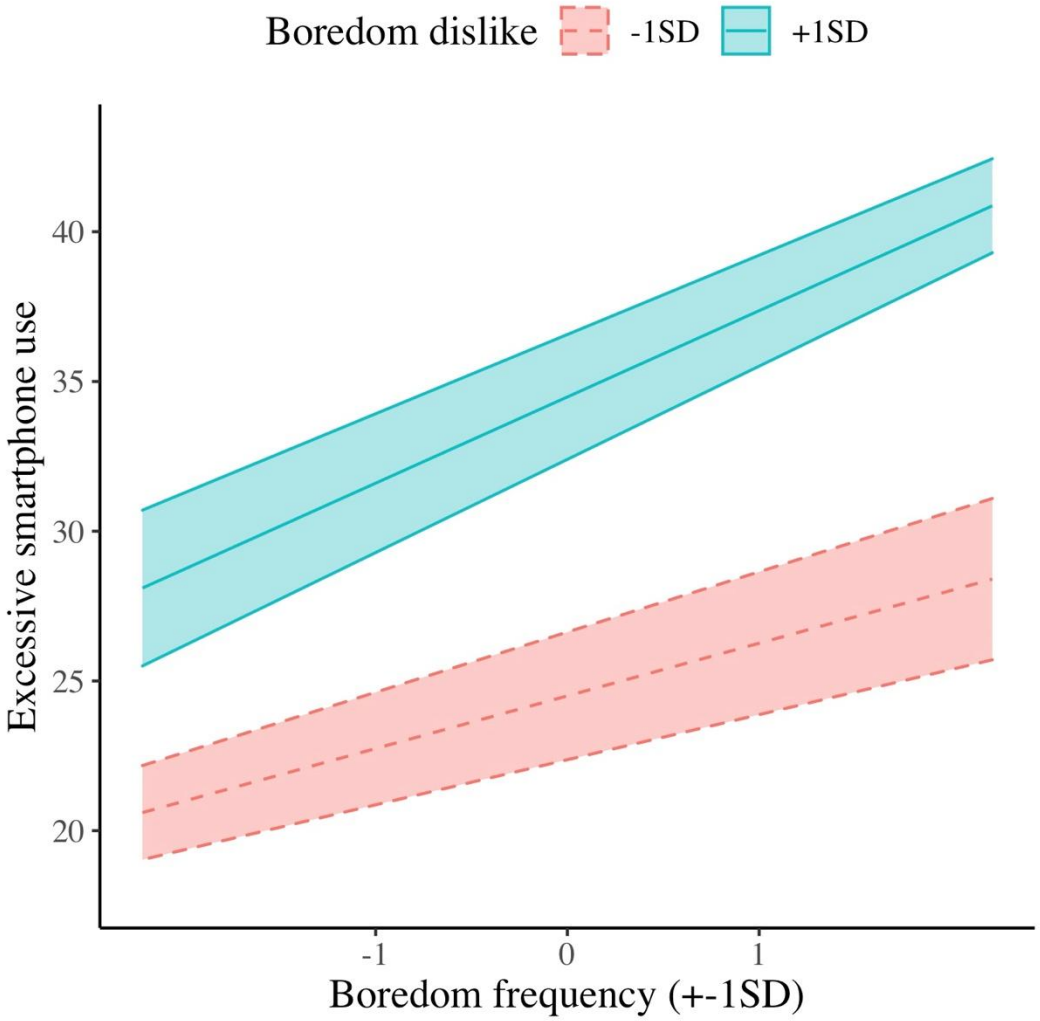
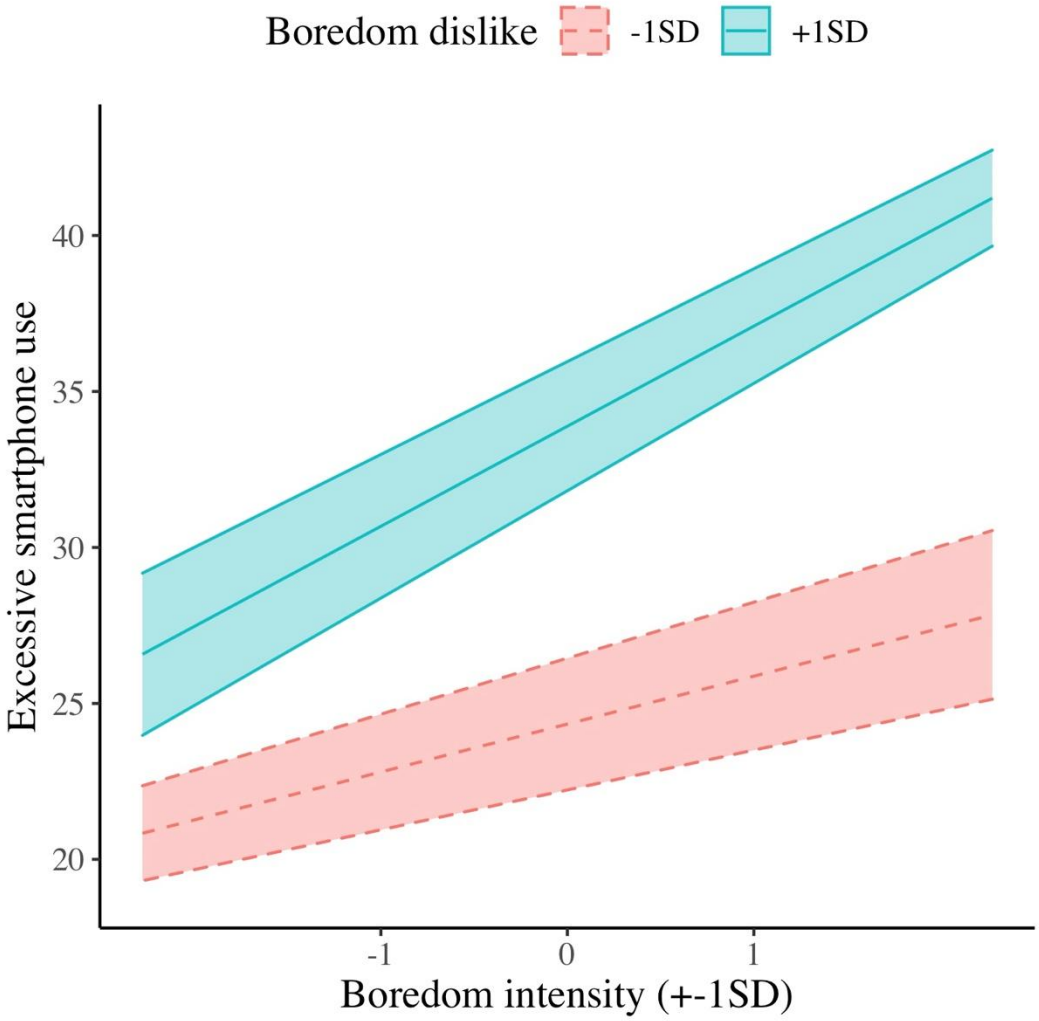


Figure 2

Simple Slopes for Between-person Associations of Boredom Dislike and Boredom Intensity in the Prediction of Excessive Smartphone Use in Study 1



2.3. Discussion

In Study 1, we performed regression analyses to test the between-person associations of boredom dislike, boredom experience, and smartphone use. We found support for both hypotheses. Participants who showed higher levels of boredom dislike compared to others reported higher levels of boredom frequency (H1a), intensity (H1b), as well as excessive smartphone use. Also, those who felt bored more often and more intensely tended to report

higher excessive smartphone use; these associations were stronger among those higher in boredom dislike (H2a & H2b).

Study 1 used a self-report measure of excessive smartphone use, which might not be an accurate presentation of everyday smartphone behaviours. Also, it presented between-person data which could not inform whether bored people are more likely to avoid their emotion through smartphone use *when* they dislike the emotion more strongly. Therefore, we conducted a longitudinal study which collected participants' objective smartphone use data and examined the within-person associations of the targeted constructs.

3. Study 2

Study 2 sought to extend the results from Study 1 in several ways. It employed a three-wave longitudinal design, in which participants reported their levels of boredom dislike, boredom experience, and smartphone use every four months. This allowed us to test whether the results on the between-person variations in these constructs (i.e., how a person differs from others) are generalizable to the within-person level (i.e., how a person differs from one occasion to another). Further, while Study 1 administered a self-report measure of excessive smartphone use, in Study 2, we collected objective smartphone data—the amount of screen time recorded on the participants' phones. Evaluating our hypotheses with different assessment of smartphone behaviour at within-person level contributes to the generalizability and robustness of our findings.

3.1. Method

3.1.1. Participants

We recruited participants from [masked] through a campus-wide email. They were invited to complete a baseline survey and then fill out two follow-up surveys in a 4-month

interval. Data were collected between February and April 2020 (Time 1, T1), between June and August 2020 (Time 2, T2), and between October 2020 and January 2021 (Time 3, T3). A total of 534 participants responded to the T1 survey, and 301 returned at T2, with 214 completing the final T3 survey. In exchange for participation, participants were entered into a lucky draw after completing each wave of survey. We excluded those who failed an attention check item (n = 47 at T1, n = 22 at T2, n = 11 at T3), who were not iPhone[1] users or unwilling to report their smartphone data (n = 246 at T1, n = 144 at T2, n = 100 at T3)[2], and who provided ambiguous answers (e.g., "2:15" and "4/5 hours"; n = 11 at T1, n = 3 at T2, n = 5 at T3) when reporting their average smartphones' screen time. The final samples were comprised of 230 participants at T1, 132 at T2, and 98 at T3, with a total of 261 participants providing valid data at least once (77.4%; age range = [17, 62], M = 22.8, SD = 6.36).

3.1.2. Procedure and Measures

Data were collected as part of a larger project on boredom ([masked]). Participants who signed up for the study received an email containing their assigned random ID number, password, and a link directing them to an online survey. The ID number and password were used to match their responses across three time points. We assessed boredom dislike (α = .82) using the same measure as in Study 1. Participants were asked to indicate how often they had felt bored (1 = *none of the time*, 9 = *all of the time*) in the last month at T1, and in the last four months at T2 and T3; they then reported the corresponding intensity of boredom (1 = *very mild*, 9 = *very intense*). For objective smartphone use, participants were asked "We would like to know a few

[1] Due to the absence of built-in function in Androids to record smartphone usage at the time of data collection, we were only able to obtain objective screen time data from iPhone users.
[2] There was no significant difference in boredom dislike, boredom frequency, or boredom intensity between data points with and without screen time data (see Appendix A).

information on your objective smartphone usage data through the 'Screen Time' function on iPhone. Are you an iPhone user?" (1 = *Yes*, 2 = *Yes but I do not want to report my Screen Time*, 3 = *No*); and those indicated "Yes" were invited to report their "Average Screen Time for last 7 days."

3.1.3. Data Analysis

We conducted multilevel modelling analysis to account for the nested data structure with 460 data points (Level 1) within 261 respondents (Level 2). We used *lme4* (Bates et al., 2015) and *lmerTest* (Kuznetsova et al., 2017) in *R* version 4.0.5 (R Core Team, 2021). For Hypothesis 1, we tested multilevel models with boredom frequency (or boredom intensity) as the dependent variable, boredom dislike as fixed predictor, and participant as random intercept. We conducted multilevel Poisson regression analyses to test Hypothesis 2, given that the dependent variable, screen time (in minutes), were count data. We used maximum likelihood estimation with adaptive Gauss-Hermite quadrature for the computation of the log-likelihood function. In the models, screen time was predicted by boredom frequency (or boredom intensity), boredom dislike, and their interaction term; participant was specified as random intercept. Since all the predictors were measured at Level 1, they were person-mean centered. This procedure provided estimates of within-person variations of these predictors from time point to another.

3.2. Results

Descriptive statistics and correlations of the measured variables are presented in Table 1. The intra-class correlations (ICCs) were .55 for boredom dislike, .50 for boredom frequency, .48 for boredom intensity, and .60 for smartphone use. The ICC for boredom dislike is similar to that found in previous research (Tam, Chan, et al., 2023), indicating that boredom dislike varies within participants over time. Participants reported a median screen time of 337.3 minutes per

day over the past seven days (M = 353.5, SD = 154.5, *range* = 40 – 1020.7). In other words, they spent around 5 hours a day on their smartphones.

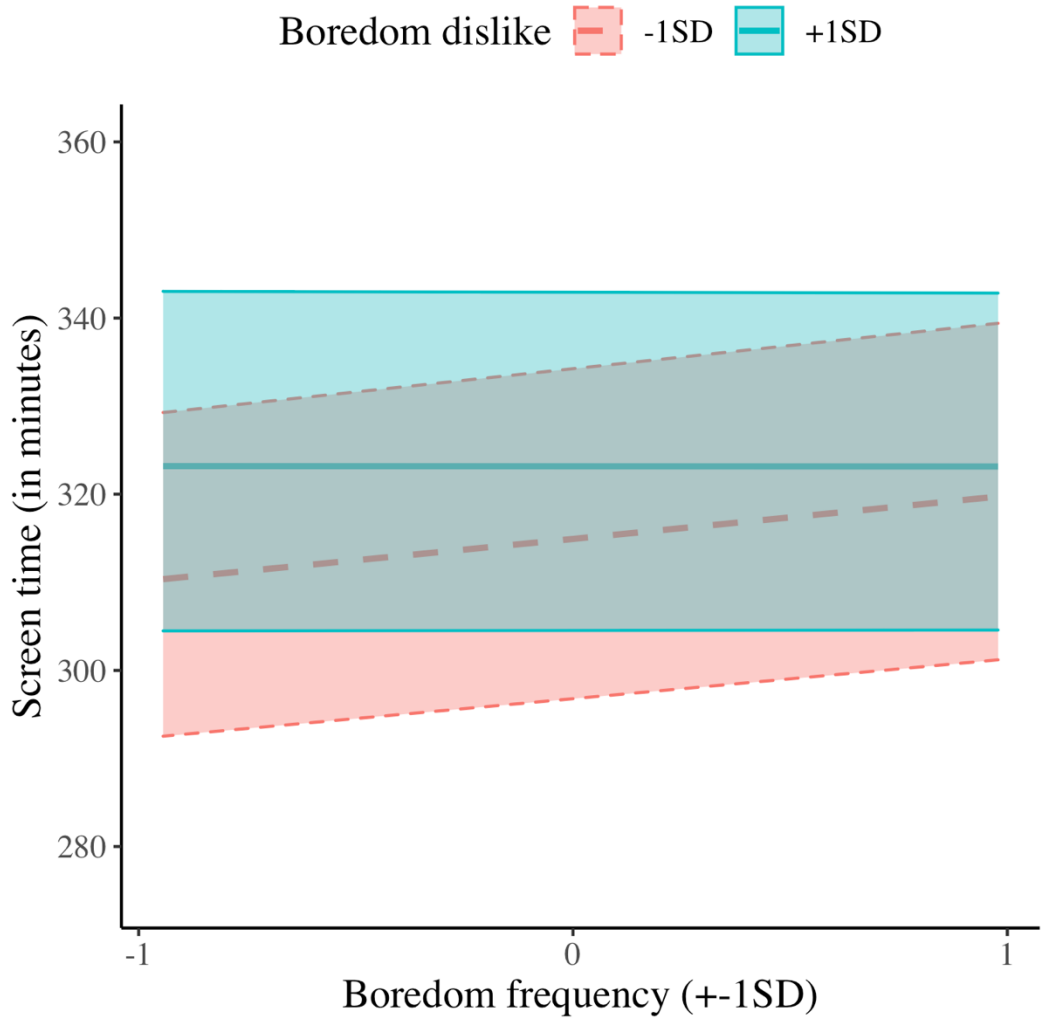
Supporting Hypothesis 1, in random-intercept regression models, boredom dislike positively predicted boredom frequency, B = 0.43, SE = .096, p < .001 (H1a), and boredom intensity, B = 0.43, SE = .094, p < .001 (H1b). Moreover, in another random-intercept Poisson regression model, boredom dislike positively predicted screen time, B = 0.023, SE = .004, p < .001.

To test Hypothesis 2, a random-intercept Poisson regression model was estimated with screen time as the dependent variable (H2a). Screen time was predicted by boredom dislike (B = 0.020, SE = .004, p < .001), boredom frequency (B = 0.008, SE = .003, p = .008), and their interaction term (B = -0.012, SE = .005, p = .016). A simple slopes analysis showed that boredom frequency was significantly associated with screen time in low (-1 SD below the mean) level of boredom dislike, B = 0.016, SE = .004, p < .001, but not in high (+1 SD above the mean) level of boredom dislike, B < -0.001, SE = .004, p = .988 (Figure 3; H2a). These two slopes were significantly different, B = 0.016, SE = .006, p = .016.

In another random-intercept Poisson regression model (H2b), screen time was predicted by boredom dislike (B = 0.018, SE = .004, p < .001), boredom intensity (B = 0.012, SE = .003, p < .001), but not their interaction term (B = 0.001, SE = .004, p = .789).

Figure 3

Simple Slopes for Within-person Associations of Boredom Dislike and Boredom Frequency in the Prediction of Smartphone Screen Time in Study 2



3.3. Discussion

In Study 2, we undertook multilevel analyses examining the within-person associations between boredom dislike, boredom experience, and smartphone use. The results supported Hypothesis 1. At times participants reported a higher level of boredom dislike, they felt bored more frequently (H1a) and intensely (H1b) and reported longer screen time. Findings regarding the interaction effect specified in Hypothesis 2 appeared less consistent with Study 1, which

might be attributed to the differences in smartphone use measures and differences in the levels (within-person or between-person) under investigation. Boredom frequency only positively predicted screen time in low level of boredom dislike (H2a). It suggests that when participants disliked boredom less than their usual level, they used smartphones more when they felt bored more frequently; when participants disliked boredom more than their usual level, they engaged in smartphone use irrespective of their boredom frequency. Further, there was no significant moderating effect of boredom dislike on the association between boredom intensity and smartphone use (H2b). In both models, boredom dislike consistently positively predicted smartphone screen time, indicating that participants spent longer time on their screens when they had stronger boredom dislike.

4. General Discussion

A desire to escape is a defining feature of boredom (Smith & Ellsworth, 1985). Whether people do so through relatively adaptive (Mann & Cadman, 2014; Van Tilburg & Igou, 2017b) or maladaptive (Havermans et al., 2015; Pfattheicher et al., 2021) means is, in part, a matter of choice. Across a correlational and a three-wave longitudinal study, we examined both individual differences and intrapersonal fluctuations of boredom dislike, boredom experience, and smartphone use (assessed as self-report excessive use in Study 1 and objective screen time in Study 2).

At both between-person (Study 1) and within-person (Study 2) levels, boredom dislike was positively associated with the frequency (H1a) and intensity (H1b) of boredom, as well as smartphone use. Moreover, boredom dislike moderated the associations of boredom frequency (Studies 1 & 2; H2a) and intensity (Study 1; H2b) with smartphone use. Together, these findings suggest that boredom dislike reflects a broader negative (or aversive) orientation toward

boredom, which may increase individuals' motivation to avoid this emotional state. This orientation, in turns, promote reliance on readily accessible avoidance behaviours such as smartphone use.

We found support for Hypothesis 1. Disliking boredom more strongly, compared to others and compared to one's average, predicted more frequent (H1a) and intense (H1b) boredom experiences. This is consistent with previous results on the positive association between boredom dislike and boredom experience (Tam, Chan, et al., 2023; Tam, Van Tilburg, et al., 2023), as well as the findings that disliking of withdrawal-oriented emotions was positively associated with the corresponding trait emotions (Harmon-Jones et al., 2011). There are two possible explanations for this relationship. First, people might develop a greater aversion to boredom because they were exposed to this emotion in a more frequent and intense manner. Second, based on the theory by Ford and Gross (2018), a negative affective evaluation of boredom might make people more sensitive to the signs of boredom and evaluate boring situation more negatively; as such, they feel bored more often and more intensely. Future research with experimental design is needed to delineate the directionality and causality of the relationship between boredom dislike and boredom experience.

We also found support for Hypothesis 2. Boredom frequency and intensity positively predicted smartphone use, which parallels previous findings on chronic boredom and excessive smartphone use (e.g., Elhai et al., 2018; Wolniewicz et al., 2020). Taking a step further, our results reveal that boredom dislike moderated the relationship of boredom frequency (Studies 1 & 2; H2a) and intensity (Study 1; H2b) with smartphone use. At the between-person level, the positive associations of boredom frequency and intensity with excessive smartphone use were more salient among participants who displayed stronger boredom dislike than others.

At the within-person level, the positive association between boredom frequency and smartphone use was only significant in low levels of boredom dislike; participants engaged in smartphone use irrespective of their boredom frequency in high levels of boredom dislike. According to the Boredom Feedback Model (Tam, Van Tilburg, Chan, et al., 2021), boredom is triggered by a gap between one's desired and actual levels of attentional engagement. People's avoidance strategies, such as using smartphones, that successfully reduce boredom are reinforced. Over time, through negative reinforcement, people may learn to pull out their smartphones to avoid the potential unpleasant experience of boredom whenever their attentional engagement drops, irrespective of their actual level of boredom. Based on this theoretical supposition, a possible explanation for our findings is that at the times participants more negatively evaluated boredom engaged in more smartphone use to reduce the possibility of feeling bored, irrespective of their actual experience of boredom. This aligns with previous qualitative findings that some participants who held negative evaluations of boredom would avoid feeling bored "at all costs" (Tam, Van Tilburg, et al., 2023).

Indeed, boredom dislike positively predicted smartphone use at both between-person and within-person levels. Participants who disliked feeling bored tended to report excessive smartphone use. Moreover, when participants disliked boredom more than their average level, they reported longer screen time. These results suggest that boredom dislike could be a motivator for smartphone use. They are in line with previous empirical findings that the disliking of emotion promotes avoidance motivation (Harmon-Jones et al., 2011; Markovitch et al., 2017; Sydenham et al., 2017). They also corroborated the theoretical proposition by Ford and Gross (2019) on the importance of emotion belief on the emotion regulation process; it is possible that

people who dislike boredom are more likely to see the need to regulate it and thus engage in smartphone behaviours to cope with it.

4.1. Implications

The present research provides novel insights into the role of a boredom belief in boredom experience and coping. Extensive evidence points to the links between boredom and diverse behavioural outcomes (e.g., Havermans et al., 2015; Moynihan et al., 2015). Yet, scarce research has examined what affect people's choice of boredom coping strategies. Our results suggest that people who dislike boredom strongly are more likely to avoid it through smartphone use. This belief might be a reason why boredom is so often avoided (Smith & Ellsworth, 1985). Future research could examine the moderating role of boredom dislike in the relationships between boredom and other problematic behaviours like sadistic aggression (Pfattheicher et al., 2021) and risk taking (Kılıç et al., 2020). Boredom dislike appears to be a promising intervention target (Ford & Gross, 2019; Wittkamp et al., 2022) for unconstructive boredom coping, considering its within-person variability in Study 2 (45% of the total variance was due to differences within participants and errors).

Given that boredom functions to signal a need for behavioural changes in search for meaning (Bench & Lench, 2013; Van Tilburg & Igou, 2012), our research raises interesting questions—are people who dislike boredom more or less able to respond to this signal? Is smartphone use an effective way to cope with boredom? The positive association between boredom and smartphone use might be bidirectional. Smartphone use does not seem to alleviate boredom; instead, it intensifies the feeling (Barkley & Lepp, 2021; Dwyer et al., 2018). Additionally, excessive smartphone use is associated with lower life meaning (Çevik et al., 2020)

and poorer mental health (Sohn et al., 2019; J. Yang et al., 2020). From our results, people use their smartphones more not only when they are bored, but also if they dislike being bored.

4.2. Limitations and Future Directions

The current research has several limitations. First, our results were correlational, and as such no causal inference could be made. While Study 2 was longitudinal in design, we examined the within-person variations in boredom dislike, boredom experience, and smartphone use from one time point to another; these findings were hence correlational. Future research with experimental method is necessary to test the directionality and causality of the relationships between boredom dislike and boredom experience, and between boredom dislike and smartphone use.

Second, we were only able to obtain objective screen time data from iPhone users, given the absence of a built-in function in Androids to record smartphone use at the time of data collection. We did not find significant difference in boredom dislike, boredom frequency and boredom intensity between observations with and without screen time data (see Appendix A). However, it is uncertain whether systematic differences in smartphone behaviour exist between people who use Androids and iPhones.

Third and relatedly, participants in Study 2 rated their levels of boredom frequency and intensity in the last month at T1 and in the last four months at T2 and T3, while reporting their boredom dislike without a specified time frame. The reported screen time was the average of the last seven days at each time point, because the Screen Time app was unable to track screen time beyond this duration during data collection. Future studies are encouraged to measure these items with similar time scales.

Fourth, our interpretation of the results focused on participants using smartphones to avoid boredom, as we examined the relationship between boredom experience and smartphone use. However, smartphones serve multiple functions, and participants may have engaged in a variety of activities using their smartphones that were unrelated to boredom regulation. Relatedly, we did not assess the specific types of smartphone use captured within total screen time. Future research could consider differentiate between types of smartphone activities to better understand how boredom aversion relates to usage patterns.

Fifth, our findings, along with prior longitudinal evidence (Tam, Chan, et al., 2023), suggest that boredom dislike varies over time. Future research can consider examining the factors that contribute to these fluctuations, as well as the contexts in which individuals are more or less averse to boredom.

5. Conclusion

Boredom is a prevalent emotion in everyday life that leads to a wide range of behavioural outcomes. Findings from our correlational and longitudinal studies show that disliking boredom was associated with experiencing this emotion more often and more intensely. Such an aversion to boredom also predicted excessive smartphone use and longer screen time. It moderated the association of boredom frequency and intensity with smartphone use. Our results provide novel insights into the role of a boredom belief in smartphone use.

Reference

Al-Saggaf, Y., MacCulloch, R., & Wiener, K. (2019). Trait boredom is a predictor of phubbing frequency. *Journal of Technology in Behavioral Science*, *4*(3), 245–252. https://doi.org/10.1007/s41347-018-0080-4

Barkley, J. E., & Lepp, A. (2021). The effects of smartphone facilitated social media use, treadmill walking, and schoolwork on boredom in college students: Results of a within subjects, controlled experiment. *Computers in Human Behavior*, *114*, 106555. https://doi.org/10.1016/j.chb.2020.106555

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, *67*(1), 1–48. https://doi.org/https://doi.org/10.18637/jss.v067.i01

Bench, S. W., & Lench, H. C. (2013). On the function of boredom. *Behavioral Sciences*, *3*(3), 459–472. https://doi.org/10.3390/bs3030459

Bench, S. W., & Lench, H. C. (2019). Boredom as a seeking state: Boredom prompts the pursuit of novel (even negative) experiences. *Emotion*, *19*(2), 242–254. https://doi.org/10.1037/emo0000433

Bieleke, M., Ripper, L., Schüler, J., & Wolff, W. (2022). Boredom is the root of all evil—or is it? A psychometric network approach to individual differences in behavioural responses to boredom. *Royal Society Open Science*, *9*(9), 211998. https://doi.org/10.1098/rsos.211998

Biolcati, R., Passini, S., & Mancini, G. (2016). "I cannot stand the boredom." Binge drinking expectancies in adolescence. *Addictive Behaviors Reports*, *3*, 70–76. https://doi.org/10.1016/j.abrep.2016.05.001

Camerini, A.-L., Morlino, S., & Marciano, L. (2023). Boredom and digital media use: A systematic review and meta-analysis. *Computers in Human Behavior Reports*, *11*, 100313. https://doi.org/10.1016/j.chbr.2023.100313

Campbell-Sills, L., Barlow, D. H., Brown, T. A., & Hofmann, S. G. (2006). Effects of suppression and acceptance on emotional responses of individuals with anxiety and mood disorders. *Behaviour Research and Therapy*, *44*(9), 1251–1263. https://doi.org/10.1016/j.brat.2005.10.001

Çevik, C., Ciğerci, Y., Kılıç, İ., & Uyar, S. (2020). Relationship between smartphone addiction and meaning and purpose of life in students of health sciences. *Perspectives in Psychiatric Care*, *56*(3), 705–711. https://doi.org/10.1111/ppc.12485

Chan, C. S., Van Tilburg, W. A. P., Igou, E. R., Poon, C. Y. S., Tam, K. Y. Y., Wong, V. U. T., & Cheung, S. K. (2018). Situational meaninglessness and state boredom: Cross-sectional and experience-sampling findings. *Motivation and Emotion*, *42*(4), 555–565. https://doi.org/10.1007/s11031-018-9693-3

Crockett, A. C., Myhre, S. K., & Rokke, P. D. (2015). Boredom proneness and emotion regulation predict emotional eating. *Journal of Health Psychology*, *20*(5), 670–680. https://doi.org/10.1177/1359105315573439

Dora, J., Van Hooff, M., Geurts, S., Kompier, M., & Bijleveld, E. (2021). Fatigue, boredom and objectively measured smartphone use at work. *Royal Society Open Science*, *8*(7). https://doi.org/https://doi.org/10.1098/rsos.201915

Dwyer, R. J., Kushlev, K., & Dunn, E. W. (2018). Smartphone use undermines enjoyment of face-to-face social interactions. *Journal of Experimental Social Psychology*, *78*, 233–239. https://doi.org/10.1016/j.jesp.2017.10.007

Elhai, J. D., Dvorak, R. D., Levine, J. C., & Hall, B. J. (2017). Problematic smartphone use: A conceptual overview and systematic review of relations with anxiety and depression psychopathology. *Journal of Affective Disorders*, *207*, 251–259. https://doi.org/10.1016/j.jad.2016.08.030

Elhai, J. D., Vasquez, J. K., Lustgarten, S. D., Levine, J. C., & Hall, B. J. (2018). Proneness to boredom mediates relationships between problematic smartphone use with depression and anxiety severity. *Social Science Computer Review*, *36*(6), 707–720. https://doi.org/10.1177/0894439317741087

Elpidorou, A. (2014). The bright side of boredom. *Frontiers in Psychology*, *5*. https://doi.org/10.3389/fpsyg.2014.01245

Fahlman, S. A., Mercer, K. B., Gaskovski, P., Eastwood, A. E., & Eastwood, J. D. (2009). Does a lack of life meaning cause boredom? Results from psychometric, longitudinal, and experimental analyses. *Journal of Social and Clinical Psychology*, *28*(3), 307–340. https://doi.org/10.1521/jscp.2009.28.3.307

Farmer, R., & Sundberg, N. D. (1986). Boredom proneness—The development and correlates of a new scale. *Journal of Personality Assessment*, *50*(1), 4–17. https://doi.org/10.1207/s15327752jpa5001_2

Finkielsztein, M. (2020). Class-related academic boredom among university students: A qualitative research on boredom coping strategies. *Journal of Further and Higher Education*, *44*(8), 1098–1113. https://doi.org/10.1080/0309877X.2019.1658729

Fisher, C. D. (1993). Boredom at work: A neglected concept. *Human Relations*, *46*(3), 395–417. https://doi.org/10.1177/001872679304600305

Ford, B. Q., & Gross, J. J. (2018). Emotion regulation: Why beliefs matter. *Canadian Psychology/Psychologie Canadienne*, *59*(1), 1–14. https://doi.org/10.1037/cap0000142

Ford, B. Q., & Gross, J. J. (2019). Why beliefs about emotion matter: An emotion-regulation perspective. *Current Directions in Psychological Science*, *28*(1), 74–81. https://doi.org/10.1177/0963721418806697

Fullwood, C., Quinn, S., Kaye, L. K., & Redding, C. (2017). My virtual friend: A qualitative analysis of the attitudes and experiences of Smartphone users: Implications for Smartphone attachment. *Computers in Human Behavior*, *75*, 347–355. https://doi.org/10.1016/j.chb.2017.05.029

Goldberg, Y. K., Eastwood, J. D., LaGuardia, J., & Danckert, J. (2011). Boredom: An emotional experience distinct from apathy, anhedonia, or depression. *Journal of Social and Clinical Psychology*, *30*(6), 647–666. https://doi.org/10.1521/jscp.2011.30.6.647

Harmon-Jones, E., Harmon-Jones, C., Amodio, D. M., & Gable, P. A. (2011). Attitudes toward emotions. *Journal of Personality and Social Psychology*, *101*(6), 1332–1350. https://doi.org/10.1037/a0024951

Harris, M. B. (2000). Correlates and characteristics of boredom proneness and boredom. *Journal of Applied Social Psychology*, *30*(3), 576–598. https://doi.org/10.1111/j.1559-1816.2000.tb02497.x

Havermans, R. C., Vancleef, L., Kalamatianos, A., & Nederkoorn, C. (2015). Eating and inflicting pain out of boredom. *Appetite*, *85*, 52–57. https://doi.org/10.1016/j.appet.2014.11.007

Hunter, A., & Eastwood, J. D. (2016). Does state boredom cause failures of attention? Examining the relations between trait boredom, state boredom, and sustained attention. *Experimental Brain Research*, *236*(9), 2483–2492. https://doi.org/10.1007/s00221-016-4749-7

Karnaze, M. M., & Levine, L. J. (2018). Data versus Spock: Lay theories about whether emotion helps or hinders. *Cognition and Emotion*, *32*(3), 549–565. https://doi.org/10.1080/02699931.2017.1326374

Kılıç, A., Van Tilburg, W. A. P., & Igou, E. R. (2020). Risk-taking increases under boredom. *Journal of Behavioral Decision Making*, *33*(3), 257–269. https://doi.org/10.1002/bdm.2160

Ksinan, A. J., Mališ, J., & Vazsonyi, A. T. (2021). Swiping away the moments that make up a dull day: Narcissism, boredom, and compulsive smartphone use. *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues*, *40*(6), 2917–2926. https://doi.org/10.1007/s12144-019-00228-7

Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2017). lmerTest package: Tests in linear mixed effects models. *Journal of Statistical Software*, *82*(13). https://doi.org/https://doi.org/10.18637/jss.v082.i13

Kwon, M., Kim, D.-J., Cho, H., & Yang, S. (2013). The Smartphone Addiction Scale: Development and validation of a short version for adolescents. *PLOS ONE*, *8*(12), e83558. https://doi.org/10.1371/journal.pone.0083558

Lee, F. K. S., & Zelman, D. C. (2019). Boredom proneness as a predictor of depression, anxiety and stress: The moderating effects of dispositional mindfulness. *Personality and Individual Differences*, *146*, 68–75. https://doi.org/10.1016/j.paid.2019.04.001

Lepp, A., Barkley, J. E., & Li, J. (2017). Motivations and experiential outcomes associated with leisure time cell phone use: Results from two independent studies. *Leisure Sciences*, *39*(2), 144–162. https://doi.org/10.1080/01490400.2016.1160807

Lomas, T. (2017). A meditation on boredom: Re-appraising its value through introspective phenomenology. *Qualitative Research in Psychology*, *14*(1), 1–22. https://doi.org/10.1080/14780887.2016.1205695

Mann, S., & Cadman, R. (2014). Does being bored make us more creative? *Creativity Research Journal*, *26*(2), 165–173. https://doi.org/10.1080/10400419.2014.901073

Markovitch, N., Netzer, L., & Tamir, M. (2017). What you like is what you try to get: Attitudes toward emotions and situation selection. *Emotion*, *17*(4), 728–739. https://doi.org/10.1037/emo0000272

Martarelli, C. S., Weibel, D., Popic, D., & Wolff, W. (2024). Time in suspense: Investigating boredom and related states in a virtual waiting room. *Cognition and Emotion*, 1–15. https://doi.org/10.1080/02699931.2024.2349279

Moynihan, A. B., Van Tilburg, W. A. P. van, Igou, E. R., Wisman, A., Donnelly, A. E., & Mulcaire, J. B. (2015). Eaten up by boredom: Consuming food to escape awareness of the bored self. *Frontiers in Psychology*, *6*. https://doi.org/10.3389/fpsyg.2015.00369

Nakamura, S., Darasawang, P., & Reinders, H. (2021). A practitioner study on the implementation of strategy instruction for boredom regulation. *Language Teaching Research*, 13621688211010272. https://doi.org/10.1177/13621688211010272

Nederkoorn, C., Vancleef, L., Wilkenhöner, A., Claes, L., & Havermans, R. C. (2016). Self-inflicted pain out of boredom. *Psychiatry Research*, *237*, 127–132. https://doi.org/10.1016/j.psychres.2016.01.063

Nett, U. E., Goetz, T., & Daniels, L. M. (2010). What to do when feeling bored? Students' strategies for coping with boredom. *Learning and Individual Differences*, *20*(6), 626–638. https://doi.org/10.1016/j.lindif.2010.09.004

Nett, U. E., Goetz, T., & Hall, N. C. (2011). Coping with boredom in school: An experience sampling perspective. *Contemporary Educational Psychology*, *36*(1), 49–59. https://doi.org/10.1016/j.cedpsych.2010.10.003

Oxtoby, J., Schroeter, R., Johnson, D., & Kaye, S.-A. (2019). Using boredom proneness to predict young adults' mobile phone use in the car and risky driving. *Transportation Research Part F: Traffic Psychology and Behaviour*, *65*, 457–468. https://doi.org/10.1016/j.trf.2019.08.008

Pfattheicher, S., Lazarević, L. B., Westgate, E. C., & Schindler, S. (2021). On the relation of boredom and sadistic aggression. *Journal of Personality and Social Psychology*, *121*(3), 573–600. https://doi.org/https://doi.org/10.1037/pspi0000335

Predatu, R., David, D. O., & Maffei, A. (2020). The effects of irrational, rational, and acceptance beliefs about emotions on the emotional response and perceived control of emotions. *Personality and Individual Differences*, *155*, 109712. https://doi.org/10.1016/j.paid.2019.109712

R Core Team. (2021). R: A language and environment for statistical computing (Version 4.0.5). In *R Foundation for Statistical Computing*. https://www.R-project.org/

Samaha, M., & Hawi, N. S. (2016). Relationships among smartphone addiction, stress, academic performance, and satisfaction with life. *Computers in Human Behavior*, *57*, 321–325. https://doi.org/10.1016/j.chb.2015.12.045

Sansone, C., Weir, C., Harpster, L., & Morgan, C. (1992). Once a boring task always a boring task? Interest as a self-regulatory mechanism. *Journal of Personality and Social Psychology*, *63*(3), 379–390.

Skues, J., Williams, B., Oldmeadow, J., & Wise, L. (2016). The effects of boredom, loneliness, and distress tolerance on problem Internet use among university students. *International Journal of Mental Health and Addiction*, *14*(2), 167–180. https://doi.org/10.1007/s11469-015-9568-8

Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, *48*(4), 813–838. https://doi.org/10.1037/0022-3514.48.4.813

Sohn, S. Y., Rees, P., Wildridge, B., Kalk, N. J., & Carter, B. (2019). Prevalence of problematic smartphone usage and associated mental health outcomes amongst children and young people: A systematic review, meta-analysis and GRADE of the evidence. *BMC Psychiatry*, *19*(1), 356. https://doi.org/10.1186/s12888-019-2350-x

Sundström, M., Hjelm-Lidholm, S., & Radon, A. (2019). Clicking the boredom away – Exploring impulse fashion buying behavior online. *Journal of Retailing and Consumer Services*, *47*, 150–156. https://doi.org/10.1016/j.jretconser.2018.11.006

Sydenham, M., Beardwood, J., & Rimes, K. A. (2017). Beliefs about emotions, depression, anxiety and fatigue: A mediational analysis. *Behavioural and Cognitive Psychotherapy*, *45*(1), 73–78. https://doi.org/10.1017/S1352465816000199

Tam, K. Y. Y., Chan, C. S., Van Tilburg, W. A. P., Lavi, I., & Lau, J. Y. F. (2023). Boredom belief moderates the mental health impact of boredom among young people: Correlational and

multi-wave longitudinal evidence gathered during the COVID-19 pandemic. *Journal of Personality*, *91*(3), 638–652. https://doi.org/10.1111/jopy.12764

Tam, K. Y. Y., & Inzlicht, M. (2024). Fast-forward to boredom: How switching behavior on digital media makes people more bored. *Journal of Experimental Psychology: General*, *153*(10), 2409–2426. https://doi.org/10.1037/xge0001639

Tam, K. Y. Y., Van Tilburg, W. A. P., & Chan, C. S. (2021). What is boredom proneness? A comparison of three characterizations. *Journal of Personality*, *89*(4), 831–846. https://doi.org/10.1111/jopy.12618

Tam, K. Y. Y., Van Tilburg, W. A. P., & Chan, C. S. (2023). Lay beliefs about boredom: A mixed-methods investigation. *Motivation and Emotion*, *47*(6), 1075–1094. https://doi.org/10.1007/s11031-023-10043-0

Tam, K. Y. Y., Van Tilburg, W. A. P., Chan, C. S., Igou, E. R., & Lau, H. (2021). Attention drifting in and out: The Boredom Feedback Model. *Personality and Social Psychology Review*, *25*(3), 251–272. https://doi.org/10.1177/10888683211010297

Van Tilburg, W. A. P., & Igou, E. R. (2012). On boredom: Lack of challenge and meaning as distinct boredom experiences. *Motivation and Emotion*, *36*(2), 181–194. https://doi.org/10.1007/s11031-011-9234-9

Van Tilburg, W. A. P., & Igou, E. R. (2017a). Boredom begs to differ: Differentiation from other negative emotions. *Emotion*, *17*(2), 309–322. https://doi.org/10.1037/emo0000233

Van Tilburg, W. A. P., & Igou, E. R. (2017b). Can boredom help? Increased prosocial intentions in response to boredom. *Self and Identity*, *16*(1), 82–96. https://doi.org/10.1080/15298868.2016.1218925

Van Tilburg, W. A. P., Igou, E. R., & Sedikides, C. (2013). In search of meaningfulness: Nostalgia as an antidote to boredom. *Emotion*, *13*(3), 450–461. https://doi.org/10.1037/a0030442

Webster, E. A., & Hadwin, A. F. (2015). Emotions and emotion regulation in undergraduate studying: Examining students' reports from a self-regulated learning perspective. *Educational Psychology*, *35*(7), 794–818. https://doi.org/10.1080/01443410.2014.895292

Witowska, J., Schmidt, S., & Wittmann, M. (2020). What happens while waiting? How self-regulation affects boredom and subjective time during a real waiting situation. *Acta Psychologica*, *205*, 103061. https://doi.org/10.1016/j.actpsy.2020.103061

Wittkamp, M. F., Nowak, U., Clamor, A., & Lincoln, T. M. (2022). How you think about an emotion predicts how you regulate: An experience-sampling study. *Cognition and Emotion*, 1–9. https://doi.org/10.1080/02699931.2022.2027744

Wolff, W., & Martarelli, C. S. (2020). Bored into depletion? Toward a tentative integration of perceived self-control exertion and boredom as guiding signals for goal-directed behavior. *Perspectives on Psychological Science*, *15*(5), 1272–1283. https://doi.org/10.1177/1745691620921394

Wolniewicz, C. A., Rozgonjuk, D., & Elhai, J. D. (2020). Boredom proneness and fear of missing out mediate relations between depression and anxiety with problematic smartphone use. *Human Behavior and Emerging Technologies*, *2*(1), 61–70. https://doi.org/10.1002/hbe2.159

Yakobi, O., Boylan, J., & Danckert, J. (2021). Behavioral and electroencephalographic evidence for reduced attentional control and performance monitoring in boredom. *Psychophysiology*, *58*(6). https://doi.org/10.1111/psyp.13816

Yang, J., Fu, X., Liao, X., & Li, Y. (2020). Association of problematic smartphone use with poor sleep quality, depression, and anxiety: A systematic review and meta-analysis. *Psychiatry Research*, *284*, 112686. https://doi.org/10.1016/j.psychres.2019.112686

Yang, X.-J., Liu, Q.-Q., Lian, S.-L., & Zhou, Z.-K. (2020). Are bored minds more likely to be addicted? The relationship between boredom proneness and problematic mobile phone use. *Addictive Behaviors*, *108*, 106426. https://doi.org/10.1016/j.addbeh.2020.106426

Zhang, L., Wang, B., Xu, Q., & Fu, C. (2023). The role of boredom proneness and self-control in the association between anxiety and smartphone addiction among college students: A multiple mediation model. *Frontiers in Public Health*, *11*, 1201079. https://doi.org/10.3389/fpubh.2023.1201079

Zhang, Y., Li, S., & Yu, G. (2022). The longitudinal relationship between boredom proneness and mobile phone addiction: Evidence from a cross-lagged model. *Current Psychology*, *41*, 8821–8828. https://doi.org/https://doi.org/10.1007/s12144-020-01333-810.1007/s12144-020-01333-8

Appendix A.

Comparing Data Points with and without Screen Time

We conducted multilevel modelling analyses to test whether there were significant differences in boredom dislike, boredom frequency, and boredom intensity between those who reported objective screen time data and those who did not in Study 2. We computed a variable by coding data points with screen time data as 1 (n = 460) and those without screen time data as 0 (n = 490). This variable was then subjected to multilevel models, with participant specified as random intercept, to predict boredom dislike, boredom frequency or boredom intensity. The binary screen time variable was not a significant predictor of boredom dislike (B = -0.105, SE = .094, p = .267), boredom frequency (B = 0.175, SE = .135, p = .196), or boredom intensity (B = -0.092, SE = .132, p = .487).