Reappraising Boredom
An Investigation of Boredom Beliefs, Experience, Coping and Well-being

Tam, Yuen Yan

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Submitted by

Yuen Yan (Katy) TAM

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Being bored is a common daily affective experience that brings varying behavioural and mental health consequences. Some see boredom as an emotion which carries unique functions; others believe it causes evil and is comparable to hell. This thesis investigates how people's lay beliefs about boredom relate to the ways boredom is experienced and coped with, as well as their relationships with mental well-being. Across eight samples, the role of boredom beliefs was scrutinised using multiple methods, including qualitative interviews, scale development, correlational surveys, and longitudinal studies.

After presenting an overview of the thesis in Chapter 1, Chapters 2 and 3 examine boredom as momentary state and as chronic experience. Chapter 2 synthesizes existing literature on boredom to propose a new theoretical framework as the Boredom Feedback Model. Chapter 3 investigates the characterizations of boredom proneness; it reports data indicating that boredom frequency, boredom intensity and perceived life boredom each represents some aspects of boredom proneness.

Chapter 4 explores what lay beliefs about boredom people have. Through qualitative and survey data, three boredom beliefs were identified—whether one appreciates the functions of boredom (*boredom functionality*), dislikes being bored (*boredom dislike*), and believes that boredom is a normal experience (*boredom normalcy*). The Boredom Beliefs Scale was developed and validated to quantify these beliefs.

In a series of correlational and longitudinal studies, Chapters 5 and 6 examine how boredom beliefs relate to boredom experience, coping and mental health. Results in both chapters shown that, at both between- and within-person levels, boredom dislike was positively associated with boredom experience (boredom frequency and intensity). In Chapter 5, boredom dislike interacted with boredom experience in predicting smartphone use. Further, in Chapter 6, disliking boredom moderated the association between boredom experience and mental well-being among adolescents and young adults, such that the negative association was stronger in high level of boredom dislike. Also, there was a positive association between boredom normalcy and mental well-being.

Finally, Chapter 7 summarizes and synthesizes the key findings. It highlights the theoretical and practical implications of this thesis, as well as its limitations and directions for future research. To conclude, this thesis underscores the importance of boredom beliefs in mitigating the behavioural and mental health impacts of boredom.

(366 words)

Reappraising Boredom: An Investigation of Boredom Beliefs, Experience, Coping and Well-being

by

Yuen Yan (Katy) TAM

B.SocSc. (Hon), H.K.U.

A thesis submitted in partial fulfilment of the requirements
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May 2022

Declaration

I declare that this thesis represents my own work, except where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualifications.

Signed 

TAM Yuen Yan

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Publications Arising from This Thesis

The work presented in this thesis gave rise to the following publications and submissions:

Peer-reviewed Papers

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

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Poster Presentations

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Table of Contents

List of Figures

List of Tables

List of Appendices

List of Abbreviations

BBS	Boredom Beliefs Scale
BFM	Boredom Feedback Model
BPS	Boredom Proneness Scale
CFA	Confirmatory factor analysis
CFI	Confirmatory fit index
CI	Confidence interval
COVID-19	Coronavirus disease 2019
DASS	Depression Anxiety Stress Scale
EFA	Exploratory factor analysis
FFMQ-NJ	Non-judgment subscale of the Five-facet Mindfulness Questionnaires
HK	Hong Kong
HKU	The University of Hong Kong
IAE	Inadequate attentional engagement
ICC	Intra-class correlation
NAV	Negative affect valuation
PLBS	Perceived Life Boredom Scale
RMSEA	Root mean square error of approximation
SRMR	Standardized root mean square residual
TLI	Tucker–Lewis index
UK	United Kingdom
US	United States

Chapter 1
Introduction

1.1 Introduction

Boredom is intertwined with our daily experiences. Be it a long-droning presentation or a clichéd TV show, boredom is a usual companion that never fails to sprinkle a sense of discomfort over us. On the one hand, it is so commonplace that everyone feels it across many aspects of life (Chin et al., 2017); on the other hand, it is rich in meanings that prompt deep explorations among generations of philosophers, sociologists, and psychologists. What, then, is boredom?

Boredom carries many annotations: a "malady" (Fahlman et al., 2009, p. 307), an "occupational disease" (May, 1953, p. 260), "the root of all evil," (Kierkegaard, 1843/1987, p. 286, as cited in Elpidorou, 2014). In English and French, a synonym of boredom, *ennui*, refers to a sense of weariness and dissatisfaction produced by disinterest in the current circumstances (Wangh, 1975). In German, the word for boredom, *langeweile*, means "long time" (Greenson, 1953). In Chinese, a word for boredom, *mou liu* (in Cantonese; or *wu liao* in Mandarin), literally refers to 'no meaning.' In Tagalog, *inip* connotes a sense of displeasure from waiting.

All these narratives echo with findings on boredom in psychology. Boredom is commonly defined as the "aversive state of wanting to, but being unable to, engage in satisfying activities" (Eastwood et al., 2012, p. 483). It is suggested to be a state of mind (Wangh, 1975), a feeling of a particular mode of thinking (Eastwood & Gorelik, 2019), a mood (Iso-Ahola & Weissinger, 1990), or an emotion (e.g., Nett et al., 2010; Van Tilburg & Igou, 2017a). The current thesis examines boredom from the perspective that it is an emotion. From Kleinginna and Kleinginna (1981, p. 355), emotion is "a complex set of interactions among subjective and objective factors, mediated by neural/hormonal systems, which can (a) give rise to affective experiences such as feelings of arousal, pleasure/displeasure; (b) generate cognitive processes such as emotionally relevant perceptual effects, appraisals, labelling processes; (c) activate widespread physiological adjustments to the arousing conditions; and (d) lead to behaviours that is often, but not always, expressive, goal-directed, and adaptive."

Fulfilling these criteria, boredom has specific affective, cognitive, physiological, and behavioural features. Regarding its affective component, boredom is an unpleasant state (Smith & Ellsworth, 1985; Van Tilburg & Igou, 2017a) with mixed arousal levels (Danckert, Hammerschmidt, et al., 2018), in which people feel tired, restless, trapped and unchallenged (Martin et al., 2006; Van Tilburg & Igou, 2012, 2017a). Regarding its cognitive process, bored people sense a slow passage of time (Witowska et al., 2020) while perceiving the current situation as devoid of purpose (Chan et al., 2018; Van Tilburg & Igou, 2012) with low perceived control (Pekrun et al., 2010) and low uncertainty (Smith & Ellsworth, 1985). Regarding its physiological component, boredom is characterised by rising heartrate, skin temperature, cortisol level, as well as lower skin conductance response (E.-H. Jang et al., 2015; Merrifield & Danckert, 2014). Regarding its behavioural component, feeling bored drives people to escape from the current situation (Smith & Ellsworth, 1985) and search for challenging, meaningful (Van Tilburg & Igou, 2012), and novel experiences (Bench & Lench, 2019). Although boredom often co-occurs with other negative emotions such as loneliness, anger, sadness and worry (Chin et al., 2017), it is demonstrated to be a distinct emotion (Goldberg et al., 2011; Smith & Ellsworth, 1985) at lay concept, trait and state levels (Van Tilburg & Igou, 2017a).

1.2 Behavioural and Health Outcomes of Boredom

Boredom motivates a wide range of behaviours: chatting with friends, reading books, doing exercises, using smartphones, daydreaming, to name just a few (Finkielsztein, 2020; Harris, 2000; Nakamura et al., 2021; Sharp et al., 2017). While some experimental studies showed that boredom boosts prosocial intention (Van Tilburg & Igou, 2017b), prompts meaning search (Van Tilburg & Igou, 2012), sparks creativity (Mann & Cadman, 2014) and brings nostalgia (Van Tilburg et al., 2013), others have shown that bored people engage in sadistic aggression (Pfattheicher et al., 2020), risk taking (Kılıç et al., 2020), self-harm (Nederkoorn et al., 2016) and unhealthy snacking (Havermans et al., 2015; Moynihan et al., 2015). Researchers view boredom as a powerful force for behavioural changes (Wolff & Martarelli, 2020), although the changes are not necessarily healthy or constructive.

Being bored chronically has detrimental impacts. Boredom proneness—defined as people's tendency to experience boredom (Farmer & Sundberg, 1986)—shows robust relationships with poor psychological functioning and maladaptive behaviours. It is associated with clinical issues such as depressive symptoms (e.g., Goldberg et al., 2011; Malkovsky et al., 2012), anxiety (Fahlman et al., 2009), stress (Lee & Zelman, 2019), apathy, anhedonia (Goldberg et al., 2011), somatization, interpersonal sensitivity, obsessive-compulsive tendency (Sommers & Vodanovich, 2000), problems at work such as job stress, work presenteeism and procrastination (H. C. Wan et al., 2014), as well as problematic behaviours such as emotional eating (Crockett et al., 2015; Mercer-Lynn, Hunter, et al., 2013), risky driving (Oxtoby et al., 2019), problem gambling (Mercer & Eastwood, 2010), binge drinking (Biolcati et al., 2016) and problematic smartphone use (e.g., Elhai et al., 2018; Ksinan et al., 2019).

Reviewing these findings, one may be quick to jump to the conclusion that boredom is indeed "the root of all evil." However, as with other emotions, there are two sides to a coin. Every emotion has its unique functions. For example, fear prepares people to respond to danger (P. J. Lang et al., 2000) and anger can be helpful in confrontations (Sinaceur & Tiedens, 2006), yet excessive fear and anger along with maladaptive responses cause harm. Likewise, boredom serves important functions of monitoring and regulating one's behaviours (Elpidorou, 2014). It (i) informs one that the current situation is unengaging and purposeless, as well as (ii) motivates cognitive and behavioural changes to restore engagement and meaning (e.g., Bench & Lench, 2013; Danckert, Mugon, et al., 2018; Eastwood & Gorelik, 2019; Elpidorou, 2014; Van Tilburg & Igou, 2012, 2017b). The aforementioned negative and positive outcomes are not necessarily brought by boredom; they might instead be the results of how people *choose* to cope with it. How one responds to boredom matters in two crucial ways: first, frequent maladaptive responses to boredom may bring ill-effects; second, ineffective coping may prolong and intensify the experience of boredom, thereby hurting one's well-being.

1.3 Emotion Beliefs

What might consistently shape the way people experience and cope with boredom? *Emotion beliefs* might be one such factor, hinted in emerging

theoretical and empirical research (e.g., Ford, Lam, et al., 2018; Ford & Gross, 2018). Many constructs that pertain to emotion beliefs have been proposed in the literature, including *implicit theories of emotion* (Tamir et al., 2007) as beliefs people hold implicitly towards the controllability and malleability of emotions, *attitudes towards emotion* as people's subjective evaluations of emotion that are represented in memory (Harmon-Jones et al., 2011; Netzer et al., 2018), *affect valuation* as higher-ordered appraisal of affective state (Luong et al., 2016), and *beliefs about emotion* as the ways people think about emotions (e.g., Becerra et al., 2020; Ford & Gross, 2018, 2019; Veilleux et al., 2021). There has not been a consensus on whether emotion beliefs are appraisals, attitudes, beliefs, or cognitions. In this thesis, we refer all of them as emotion beliefs—as one's subjective evaluations of emotion.

People carry all sorts of beliefs about an emotion, whether it is good or bad (Ford & Gross, 2018, 2019), controllable or uncontrollable (Ford, Lwi, et al., 2018; Tamir et al., 2007), helpful or harmful (Karnaze & Levine, 2018; Wittkamp et al., 2022), valued or devalued (Chim et al., 2018; Luong et al., 2016), useful or useless (Tornquist & Miles, 2019); whether one's emotions are different from other people or whether these emotions last a long time (Veilleux, Chamberlain, et al., 2021).

These beliefs are distinct from how people *experience* and *regulate* emotions. The belief that an emotion is undesirable is different from suppressing it; believing that an emotion is acceptable is different from engaging in cognitive reappraisals. For instance, whereas anger is not a pleasant experience, people can appreciate its utility in negotiation; this belief in turn drives them to upregulate the emotion before negotiating (Tamir & Ford, 2012). There is a clear theoretical distinction between emotion belief and emotion regulation (e.g., Ford & Gross, 2018, 2019).

Crucially, emotion beliefs are like lens through which people see the world, fundamentally shaping how they select situations, as well as how they experience and regulate emotions. To illustrate, if you hated someone, you would likely avoid them, find the experience with them uncomfortable, and ruminate on how they have done you wrong. The same applies to emotions—people avoid emotions they dislike (Harmon-Jones et al., 2011; Markovitch et al., 2017; Sydenham et al., 2017), experience more negative meta-emotions (e.g., feeling

ashamed about feeling sad) when they feel those emotions (Predatu et al., 2020b), and cope with those emotions using maladaptive strategies such as rumination (Wittkamp et al., 2022). In what follows, we draw on a growing body of evidence to understand the impacts of emotion beliefs on (i) situation selection, (ii) emotional experience, (iii) emotion regulation, and (iv) well-being.

First, emotion beliefs direct the kinds of situations, people, products and activities one selects (Tsai, 2017). People with negative evaluations towards disgust or fear are more likely to avoid disgusting or fearful stimuli (Harmon-Jones et al., 2011; Markovitch et al., 2017). Those who believe emotions to be controllable are more likely to engage with positive and negative stimuli (Rovenpor & Isbell, 2018). Also, the more people are familiar with an emotion—regardless of whether the emotion is pleasant or unpleasant—the more they want to experience it (Ford & Tamir, 2014).

Second, emotion beliefs affect the ways emotions are experienced. While greater liking of approach-oriented emotions, like joy and anger, was associated with higher trait levels of those emotions, an inverse association was found between withdrawal-oriented emotions, like disgust and fear, and these emotions at the trait level (Harmon-Jones et al., 2011). Participants who valued calmness and other low arousal positive states experienced greater enjoyment during calming activities (Chim et al., 2018). Experimentally induced endorsement of rational or acceptance emotion beliefs was associated with decrease in negative emotions after watching an emotion-provoking video (Predatu et al., 2020a).

Third, emotion beliefs influence the process of emotion regulation, including whether one sees a need to regulate the emotion, which regulation strategies to be selected and implemented, as well as how one feels about the success or failure in regulation (Ford & Gross, 2019). Correlational findings indicated that believing that emotions help was associated with cognitive reappraisal while believing that emotions hinder was associated with suppression (Karnaze & Levine, 2018). A diary study demonstrated that participants who believed emotions to be more malleable were more likely to use cognitive change strategies, including thinking about a situation in a different way, thinking about what they could learn from it, and reminding themselves that things could be worse (Ortner & Pennekamp, 2020). In an experience-sampling study, participants who evaluated an emotion to be harmful were more likely to regulate the emotion

with maladaptive strategies such as rumination, avoidance and suppression (Wittkamp et al., 2022).

Fourth, emotion beliefs relate to one's well-being more broadly. Negative evaluation of negative emotions was associated with symptoms of depression (Yoon et al., 2018). On the contrary, negative affect valuation—the degree to which negative affective states are valued as pleasant, useful, appropriate, and meaningful—was linked with weakened associations between negative affective experiences and indicators of psychological and physical health (Luong et al., 2016). Acceptance of inner thoughts and feelings predicted less negative emotions during daily stressors, which in turn predicted better psychological well-being, greater life satisfaction and less depressive and anxiety symptoms six months later (Ford, Lam, et al., 2018). Taken together, research has invariably demonstrated the significance of emotion beliefs on (i) situation selection, (ii) emotional experience, (iii) emotion regulation, and (iv) well-being.

1.4 The Present Thesis

Given the prevalence of boredom (Chin et al., 2017) and its varying behavioural and mental health outcomes, understanding what might mitigate these relationships is an important endeavour. People hold distinct beliefs towards different emotions (Ford & Gross, 2018; Harmon-Jones et al., 2011). Extrapolating from the findings on emotion beliefs, people's *lay beliefs about boredom* might be a stable factor that consistently shapes boredom experience, coping, as well as the ways they relate to well-being. The present thesis sought to investigate this, guided by an overarching research question—how boredom beliefs relate to boredom experience, coping and well-being?

As illustrated in Table 1.1, this thesis is comprised of six main chapters that address specific yet interrelated questions. Studies were approved by the Human Research Ethics Committee at the University of Hong Kong (ref: EA1902009) unless specified otherwise.

Table 1.1
Primary Research Question of Each Chapter

Chapter	Main Research Question
2	What is boredom?
3	Is boredom proneness characterized by individual differences in the frequency of experiencing boredom, the intensity of boredom when felt, and/or a global perception of how boring one's life is?
4	What lay beliefs about boredom do people have?
5	Does boredom dislike moderate the association between boredom and smartphone use?
6	Do boredom beliefs moderate the association between boredom and mental well-being?

Note. Chapter 2 is derived from Tam, Van Tilburg, Chan, Igou, and Lau (2021), and Chapter 3 from Tam, Van Tilburg, and Chan (2021).

The thesis is structured in the following way:

In order to understand people's lay beliefs about boredom, we first need to examine what boredom is, as momentary state (Chapter 2) and as chronic experience (Chapter 3). There is a substantial body of research on boredom, yet a theoretical framework that integrates and makes sense of them is lacking. Chapter 2 is a theoretical discussion of boredom, reviewing existing boredom findings from social, educational, philosophical, clinical, and neuropsychological disciplines, as well as the specific models of boredom and meaning, attention, or appraisals. It resolves longstanding theoretical stalemate and empirical inconsistencies with a new conceptualization of boredom. The proposed Boredom Feedback Model (BFM) explicates key antecedents, experiences, and consequences of the emotion boredom.

Chapter 3 reports an empirical investigation of boredom proneness. While boredom proneness relates to many mental health problems and risky behaviours (e.g., Goldberg et al., 2011; Lee & Zelman, 2019), it has long been criticised of lacking conceptual clarity, that researchers do not know what exactly it means (for reviews, see Struk et al., 2017; Vodanovich & Watt, 2016). We report findings from two studies that examined whether boredom proneness is characterized by individual differences in the frequency of being bored, the intensity of boredom, and/or a global perception of life being boring.

After laying a foundation in Chapters 2 and 3, Chapter 4 investigates how people evaluate boredom. In this chapter, we identify what lay beliefs about boredom people have, using a bottom-up approach with qualitative and survey

data. An assessment tool that qualifies the strength of these beliefs—the Boredom Beliefs Scale (BBS)—was developed as a result.

The implications of boredom beliefs are scrutinized in Chapters 5 and 6. In Chapter 5, we administer the scale in correlational and longitudinal studies to investigate how boredom beliefs relate to the way boredom is experienced and coped with. Specifically, we test whether boredom beliefs interact with boredom experience in predicting smartphone use. In Chapter 6, boredom beliefs are examined in an ecologically valid context—among adolescents and young adults who are particularly prone to boredom (Caldwell et al., 1999; Weybright et al., 2020), during the coronavirus disease 2019 (COVID-19) pandemic when boredom was prevalent (Droit-Volet et al., 2020; Latif & Karaman, 2021). Drawing on a large-scale survey study with British young people and a 16-week eight-wave longitudinal study with Israeli adolescents, we test the moderating role of boredom beliefs on the relationship between boredom and mental well-being.

Finally, Chapter 7 presents a summary and synthesis of the main findings across all the chapters. Implications, limitations, and future directions are discussed along with a concluding remark for the thesis.

Chapter 2

A Theoretical Model of Boredom[1]

2.1 Introduction

The commonplace experience of boredom has fascinated scholars, both modern and contemporary. In recent decades, clinical, experimental, social, cognitive, educational, and personality psychologists have amassed a sizable body of research that places this familiar yet far from trivial emotion in the spotlight. Basic questions—how one gets bored, how boredom and its consequences are resolved, whether boredom has benefits—enjoy increasing theoretical and empirical treatment.

Among the various lines of inquiry, a particularly noteworthy insight is that failure in attentional engagement has been proposed (Eastwood et al., 2012) and demonstrated as a salient characteristic of boredom experiences (e.g., Danckert & Merrifield, 2018; A. Hunter & Eastwood, 2016; Merrifield & Danckert, 2014). Standing on the shoulder of this and other seminal work, we propose the Boredom Feedback Model (BFM), which characterizes boredom with a psychological feedback loop that centres on attention-shifts instigated by inadequate attentional engagement (IAE)—a discrepancy between desired and actual levels of attentional engagement. The model highlights the role of cognitive appraisals and postulates that the antecedents, experiences, and consequences of boredom are rooted in the interaction between attention shifts and these cognitive appraisals that unfold as part of an emotion feedback-loop. This synthesis can help solve several longstanding theoretical puzzles and explain empirical discrepancies in the studies of boredom.

This chapter focuses on boredom as a transient affective state. We first offer a synopsis of relevant existing theoretical accounts and focus on five

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[1] This chapter is based on a published article:

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

unresolved issues in boredom research. We then present BFM and its contribution to integrating existing evidence vis-à-vis the five unresolved issues.

2.2 Existing Theoretical Models on Boredom

Boredom is an emotion that can be, and should be, distinguished from other affective states (Van Tilburg & Igou, 2017a); it features a unique configuration of affective, cognitive, physiological, expressive, and motivational characteristics (see Nett et al., 2010; Van Tilburg & Igou, 2012). It is an unpleasant experience (e.g., Martin et al., 2006; Smith & Ellsworth, 1985; Van Tilburg & Igou, 2017a), in which people perceive time as passing slowly, and feeling restless, trapped (Martin et al., 2006), unchallenged, and perceiving the situation, and perhaps life, as meaningless (Chan et al., 2018; Van Tilburg & Igou, 2011, 2012, 2017a)

Researchers have examined boredom from diverse perspectives, focusing on its functions (e.g., Bench & Lench, 2013; Elpidorou, 2018b; Van Tilburg & Igou, 2011, 2019), its underlying attentional mechanisms (e.g., Eastwood et al., 2012; Fisher, 1993; Leary et al., 1986), its preceding appraisals (Pekrun, 2006), or its relation with self-control (Wolff & Martarelli, 2020). These different accounts each have their strengths and unique contributions. There are several excellent extensive reviews (e.g., Ros Velasco, 2019) of boredom research. We focus ours on approaches that are of particular relevance to (i) the role of attention under boredom, (ii) the function of boredom within behavioural psychological feedback loops, and (iii) the role of appraisals in the unfolding of boredom. These processes constitute the pillars of BFM.

2.2.1 Attentional Accounts of Boredom

Early attentional accounts of boredom posit that difficulties in sustaining attention on a task are central to the experience of boredom (e.g., Damrad-Frye & Laird, 1989; Fisher, 1993; Leary et al., 1986). Boredom is here conceptualized as an "affective consequence of effortful maintenance of attention to a particular stimulus event" (Leary et al., 1986, p. 968). Put differently, boredom is an unpleasant, transient state in which people struggle to maintain their attention on the current activity (Fisher, 1993). Further, attentional difficulties were suggested to be a major cue for recognizing oneself as bored (Damrad-Frye & Laird, 1989).

While these early attentional accounts offer important insights into the relationship between boredom and attentional processes, they primarily focus on boredom as a consequence of the unsuccessful act of exerting *effortful* concentration. Research has shown, however, that people can feel bored when they are not doing anything in particular (Fisher, 1987; Harris, 2000). Overcoming the limitation of these previous explications, Eastwood and colleagues (2012) define boredom at its core as an "aversive state of wanting but being unable to engage in satisfying activity" (p. 483). They propose that the presence of an unfulfilled desire (Fahlman et al., 2013), instead of the effortful control of attention, is central to the experience of boredom.

Until recently, attention theories had not elaborated in detail on the potential antecedents of attention failures and their consequences, aside from facilitating boredom. Other aspects of boredom, such as its role in regulating goal pursuit, have been less central to these models. Eastwood and Gorelik's (2019) unused cognitive potential (UCP) model, however, makes a notable advancement in this regard. The UCP model posits that boredom is "the feeling associated with a failure to engage our cognitive capacity (desire bind) such that cognitive capacity remains under-utilized (unoccupied mind)" (p. 57). This definition of boredom emphasizes the under-utilization of cognitive capacity and suggests that "desire bind" and "unoccupied mind" are necessary and sufficient conditions for boredom. By proposing that boredom signals cognitive slack and motivates people to engage in meaningful activities, the UCP model makes a helpful connection between attention-based and functional theories.

2.2.2 Functional Accounts of Boredom

Functional theories posit that, like other emotions, boredom informs and regulates behaviours. These accounts are broadly in line with research emphasizing the role of affect in self-regulation processes (Carver & Scheier, 2001), where emotions take a pivotal place in steering and offering feedback on progress in goal pursuit or goal achievement (e.g., Carver, 2006). For example, one line of research on such behavioural regulation has treated boredom as a *meaning threat*, signalling a deficiency in task- or life-meaning (e.g., Chan et al., 2018; Van Tilburg & Igou, 2012), and driving a search for meaningful alternatives (Barbalet, 1999; Van Tilburg & Igou, 2012; for reviews, see

Moynihan et al., 2020; Van Tilburg & Igou, 2019). This can facilitate (perceived) meaningful responses (e.g., prosocial tendencies, social identification, nostalgic reverie; Van Tilburg et al., 2013; Van Tilburg & Igou, 2011, 2017b) or attempts at escaping boredom by reducing self-awareness (Moynihan et al., 2015, 2017).

More broadly, Bench and Lench (2013) propose that boredom regulates behaviour by serving as both a signal and a driving force for the pursuit of alternative goals. These researchers propose that boredom facilitates exploration, even if the resultant new experience may seem unpleasant (Bench & Lench, 2019). This seems consistent with Elpidorou's theorizing on boredom (e.g., 2014, 2018b). Elpidorou puts forward a meta-model of boredom that highlights its functions as informing the presence of an unsatisfactory situation while motivating more interesting, fulfilling, or meaningful engagement. Specifically, Elpidorou argues that boredom serves the informative role of highlighting one predicament state in the face of unsatisfactory goals while motivating the pursuit of other activities that are more in line with overall aspirations. According to Elpidorou (2018b), this places boredom in the role of potentially facilitating personal growth and the attainment of a meaningful life.

The above functional and attentional approaches to boredom focus primarily on boredom's regulatory roles or its relation to attention processes, respectively. The Meaning and Attentional Components (MAC) model by Westgate and Wilson (2018) prominently features both meaning (typically associated with functional accounts) and attention (typically associated with attentional accounts). The model posits that attention and meaning are two orthogonal predictors of boredom. It suggests that a lack of attention is sufficient but not necessary for boredom and proposes different profiles of boredom as a function of meaning and attention. It explains how two types of attentional deficits, under-stimulation and over-stimulation, may produce boredom.

2.2.3 Cognitive Appraisal Accounts of Boredom

Different from the cognitive-attentional and functional accounts of boredom, treatises of boredom from the perspective of its cognitive appraisals are fewer and less integrated. Nonetheless, they are important for understanding in what settings boredom may occur and what responses may follow. Cognitive appraisal characterizes the interpretation of an environment in which emotions

unfold, its significance for oneself, and corresponding motivational reactions (Sander et al., 2005; Van Tilburg, Bruder, et al., 2019), thereby forming an essential component of emotions (Frijda, 1993; Scherer, 2001).

Research on cognitive appraisals, including those of boredom, typically examines these by contrasting different emotions against each other; a unique cognitive appraisal "profile" is established for each emotion that delineates its differences from other emotions (Ellsworth & Scherer, 2003). This differentiation not only serves to understand what makes one emotion different from another but also offers tentative insights into the specific function of emotions in the context of self-regulation. To give an example, fear and anger, both negatively valenced high arousal emotions, differ in appraised certainty; people evaluate their environment as more uncertain under fear than anger. Consistent with this difference in their cognitive appraisals, fear, relative to anger, reduces subsequent risk-taking (Lerner & Keltner, 2001). More generally, cognitive appraisals are critical in understanding how emotions unfold and what behaviours they may prompt within a given environment.

What does the literature reveal about the cognitive appraisals of boredom? One of the earliest attempts to identify boredom's cognitive appraisals was performed by Smith and Ellsworth (1985). They found that boredom was characterized by comparatively low perceived control and responsibility, low uncertainty, low effort, and low attention relative to several other emotions. Other work on boredom's cognitive appraisals, for example Van Tilburg and Igou (2012, 2017a), showed that its appraisal profile features a lack of perceived challenge, a lack of meaning, and low attentiveness. Another example is the control-value theory (Pekrun et al., 2007), which emphasizes that boredom is characterized by low perceived control over an activity and its outcome as well as the low perceived value of them (Pekrun et al., 2010). This theory explains why boredom undermines academic achievement (Pekrun et al., 2014). While cognitive appraisal approaches to boredom seem more scattered than their attentional and functional counterparts, any model that seeks to lay out the antecedents and consequences of boredom should arguably incorporate cognitive appraisals as a central component.

2.2.4 Five Unresolved Issues

Although the aforementioned accounts offer key insights into boredom, five important questions remain unresolved. The first issue concerns boredom coping and regulation.[2] Research has shown that people may cope with or regulate boredom through adaptive, constructive means (e.g., prosocial tendencies; Van Tilburg & Igou, 2017b) and maladaptive, harmful ways (e.g., unhealthy snacking, pain administration; Havermans et al., 2015; Moynihan et al., 2015). When and why do people pick up undesirable strategies, such as compulsive smartphone use, to cope with boredom as opposed to more desirable alternatives? This is an important question with significant implications that warrants a deeper investigation.

The second issue is related to the relationship between boredom and *self-control*. Does failure in self-control give rise to boredom, or vice-versa, or do they co-occur? Whereas accumulating research has demonstrated a close linkage between them (e.g., Isacescu et al., 2017; Kılıç et al., 2020), there are emerging speculations that boredom is a confound in ego-depletion research (Milyavskaya et al., 2019; Wolff & Martarelli, 2020). These questions require further examination.

The third issue revolves around *attention and meaning* as key features in the context of boredom. Separately, whether and how the lack of attention and meaning elicit boredom has been the subject of ample empirical inquiries. Yet, thus far, there seems to be only one theoretical account that explicitly postulates their relationship. Westgate and Wilson (2018) suggest that people experience "meaningless boredom" when a task involves high-level engagement but little meaning; people experience "enjoyment (low boredom)" when doing a meaningful task with low-level engagement (p. 693). In other words, according to them, people can experience boredom when they are fully attentionally engaged with a nonetheless meaningless task; people do not feel bored when they are doing a meaningful task even though their engagement in it is low. Past research,

[2] Coping and emotion regulation are closely related constructs (e.g., Compas et al., 2017). They can both refer to the effort and processes to manage, modify, or modulate emotions. Broadly speaking, they differ in whether the effort or processes are in response to a stressor. If so, coping is the more commonly used term. In this thesis, we treat coping and emotion regulation interchangeably.

however, has consistently demonstrated that attention failures typically characterize boredom (e.g., Danckert & Merrifield, 2018; A. Hunter & Eastwood, 2016; Merrifield & Danckert, 2014; Sánchez-Rosas & Esquivel, 2016). Further, lay conceptions of boredom, the experiences of boredom, and individual differences in boredom are strongly characterized by the combination of low meaning and low attention (Van Tilburg & Igou, 2017a). Of course, the finding that low meaning and attention as *typical* characteristics of boredom does not rule out the possibility that boredom experiences are *exclusively* characterized by low meaning and attention—after all, individual and context-specific emotional experiences may deviate from their prototypes. Furthermore, the tendency of low attention and meaningless situations to produce boredom (e.g., Westgate & Wilson, 2018) should not be equated with the tendency of boring situations to be both low in meaning and low in attention (e.g., Van Tilburg & Igou, 2017a). Ultimately, the questions whether and how exactly are attention and meaning related in the context of boredom remain.

The fourth issue relates to the role of *arousal* in boredom, in particular, whether boredom is a high or low arousal emotion. The literature offers a mix of accounts, suggesting high arousal (Merrifield & Danckert, 2014), low arousal (e.g., Smith & Ellsworth, 1985), both high and low arousal (Danckert, Hammerschmidt, et al., 2018), or even fluctuations between the two (e.g., O'Hanlon, 1981). Furthermore, existing theoretical models of boredom do not yet account for why boredom tends to be associated with both high-arousal emotions such as frustration, anxiety, and anger (Fahlman et al., 2013; Van Tilburg, Bruder, et al., 2019), and low arousal emotions such as fatigue (Havermans et al., 2015) and loneliness (Tam & Chan, 2019). Why does the profile of boredom appear to have such inconsistency?

The fifth issue concerns *chronic boredom*, reflected by the construct boredom proneness (i.e., people's general tendency to experience boredom; Farmer & Sundberg, 1986). A wealth of research on boredom proneness has been amassed across several decades. Notably, the construct appears to be associated with and even predicts an array of psychological and behavioural outcomes (e.g., Biolcati et al., 2016; Fahlman et al., 2009). Owing to its potential implications, researchers have called for a deeper theoretical explication of this construct (e.g.,

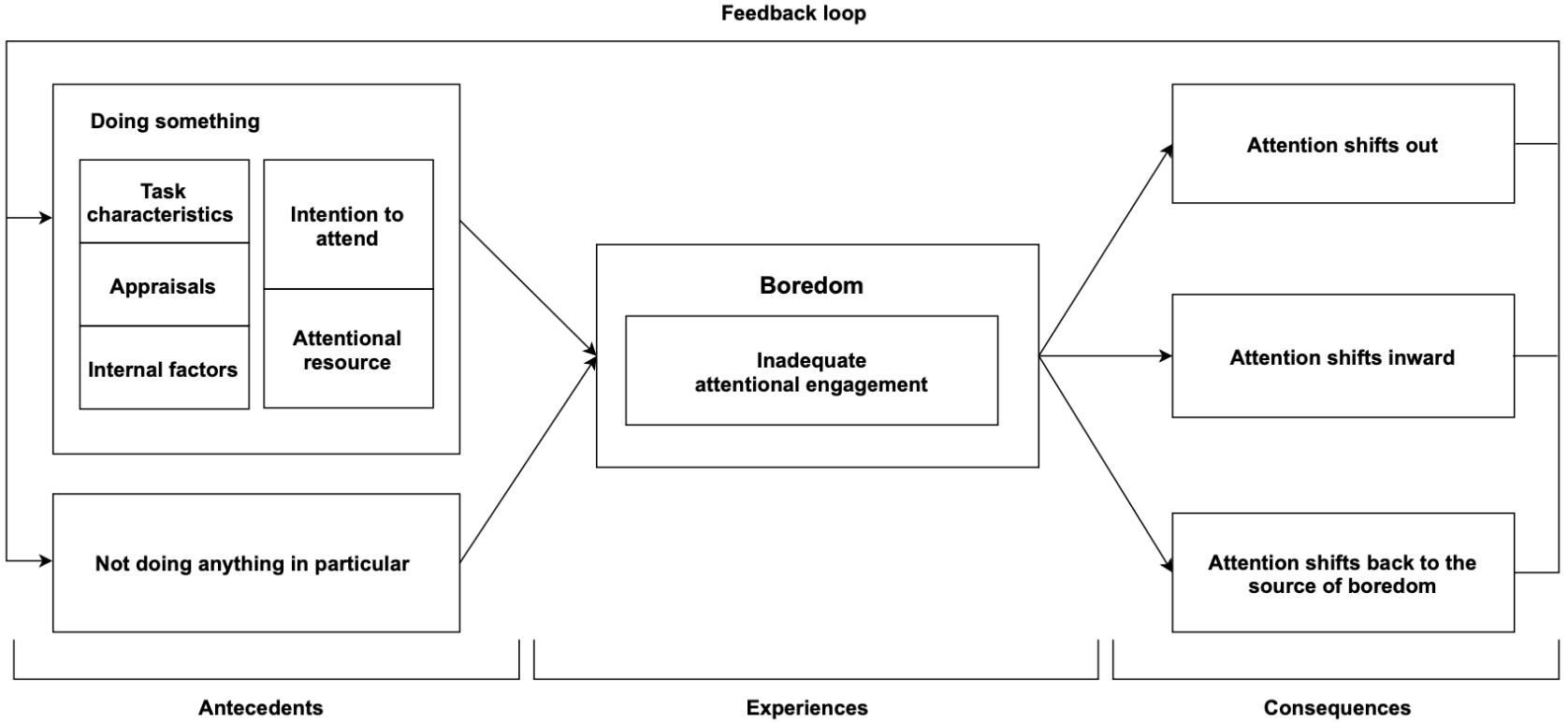
Gana et al., 2019; Struk et al., 2017). At any rate, chronic boredom is widely discussed in the literature, yet few existing models provide a clear account of its association with state boredom.

2.3 Boredom Feedback Model (BFM)

Boredom, as a momentary transient state, is associated with a number of cognitive-attentional and appraisal processes. BFM builds on the thesis that shifts in attention are essential in state boredom and that they feature in a feedback loop. As will become apparent, this model provides tentative resolutions to the five aforementioned theoretical problems by incorporating insights from attentional, functional, and appraisal approaches to boredom. The purpose of the model is not to provide a new definition of boredom but rather to integrate the current empirical knowledge on boredom and, in so doing, suggesting possible explanations for unsolved puzzles and proposing new avenues for investigation. BFM (Figure 2.1) is a componential model with the features and components described below.

Humans desire to be optimally engaged (Eastwood & Gorelik, 2019). BFM proposes that boredom would typically arise when there is a discrepancy between one's desired and actual levels of attentional engagement. When bored, one's attention tends to (1) shift to an external stimulus that is unrelated to the source of boredom (e.g., staring out the window), (2) turn inwards (e.g., mind-wandering, self-reflection), (3) and/or return to the source of boredom (e.g., reading this thesis). If where the attention then lies is not adequately engaging, the model starts from the beginning in the form of a feedback loop. While this loop may direct attention towards a rewarding pursuit (e.g., attending to an alternative cue that is appraised as more meaningful and thus worth the investment of attentional resource than one's current situation), if the loop runs for some time without resolve, then, so we theorize, boredom would amplify through operant conditioning, eventually impairing self-control under specific circumstances, eliciting other negative emotions (e.g., frustration) and resulting in fluctuating levels of low- or high-arousal response. In the long term, chronic boredom may develop into clinical issues or problematic behaviours. We turn to each component of the model in detail next.

Figure 2.1
Boredom Feedback Model



Note. This model conceptualizes boredom in terms of shifting attention and presents a hypothetical attentional mechanism underlying the emotion. A person may feel bored when there is a discrepancy between their actual and desired levels of engagement (i.e., inadequate attentional engagement). Feeling bored, their attention will either shift to an external stimulus that is unrelated to the source of boredom, go inwards, or return to the current situation. If where the attentional focus ends up is not adequately engaging, the model starts from the beginning and forming a feedback loop.

2.3.1 Inadequate Attentional Engagement as Key Condition for Boredom

Be it waiting in line or sitting through a tedious lecture, the typical boredom experience involves being compelled to stay in a situation where there is little or nothing of interest to keep one's mind occupied (Smith & Ellsworth, 1985). Building on Eastwood and colleagues' work (2012, 2019), BFM maintains that boredom tends to be experienced when there is inadequate attentional engagement (IAE), which, we propose, is the discrepancy between one's *actual level* (i.e., objectively measurable) of attentional engagement and subjectively *desired level* of attentional engagement. We argue that IAE is a key condition for boredom; it instigates attention shifts that form the feedback process underlying boredom.

Whether one's attentional engagement is adequate is, therefore, the function of both an objective state (where one is) and subjective desired level (where one wants to be). The actual level of attentional engagement can be defined (1) neurophysiologically, as the level of activity in the dorsal attention network (DAN) relative to the level of activity in the default mode network (DMN); or (2) in terms of cognitive behaviour, as assessed by dual-task inference. As in cognitive studies of dual-task performance (e.g., Irwin-Chase & Burns, 2000; Newman et al., 2007), if a task engages attention successfully, it implies that there is a cognitive cost to doing another task of similar difficulty simultaneously, where cost is defined as slowing of reaction time, increase in error rates, and the like (Verhaeghen et al., 2003).

On the other hand, the desired level of attentional engagement is subjective and context-dependent. As (in)adequate attentional engagement is relative to the desired level, what is adequate may vary from person to person and from context to context. For instance, doodling on scrap paper may not be adequately engaging when one has a range of entertainment to choose from; but it may be in the middle of a meeting you cannot skip. Indeed, an experiment found that participants who were placed in a room full of possible affordances but told to entertain themselves with their thoughts reported higher levels of boredom than those placed in an empty room (Struk et al., 2020). BFM explains these findings by suggesting that the presence of affordances increased participants' desired

level of attentional engagement, which enlarged the discrepancy between the desired and actual levels of attentional engagement, and thus heightened the likelihood of boredom.

This robust relationship between boredom and IAE has been demonstrated in correlational, psychophysiological, and neuropsychological research. For example, boredom is associated with low attention (Sánchez-Rosas & Esquivel, 2016) and with attention problems such as lack of concentration, distractibility, and task-irrelevant thinking in classroom settings (Pekrun et al., 2010). A. Hunter and Eastwood (2016) also found that attention failure is accompanied by boredom. In their study, participants completed three blocks of the Sustained Attention to Response Task and reported their boredom level immediately before and after each block. Their results indicated that attentional errors on a given block were correlated with levels of boredom reported before and after completing that block.

Boredom also shares very similar psychophysiological patterns with that of impaired attentional performance. Empirical data show that boredom is associated with rising heart rate as well as decreasing skin conductance levels over time (Merrifield & Danckert, 2014). This is indicative of a failure in attentional engagement in prior research, where people have slower heart rates and higher skin conductance levels when their attention is engaged (e.g., Bradley, 2009; Frith & Allen, 1983). In an fMRI study (Danckert & Merrifield, 2018), participants were subjected to one of four conditions: interest mood induction, boredom mood induction, sustained attention, or resting state. Participants in the interest mood condition watched an interest-inducing video; participants in the boredom condition watched a boring video; participants in the sustained attention condition completed a measure of sustained attention; whereas those in the resting state condition were instructed to relax and viewed a black fixation on a white background for eight minutes. Across the boredom, sustained attention, and resting-state conditions, the posterior regions of the DMN were consistently activated. This suggests that participants were not focusing their attention on some external tasks since DMN has been shown to be activated during internally directed tasks (e.g., mind-wandering) and deactivated when attention is externally directed (Fox et al., 2018). The DMN regions were activated while the anterior

insula cortex was deactivated (i.e., anticorrelated activity) in both the boredom and the sustained attention task condition. Co-activation of the anterior insula and the DMN regions (i.e., correlated activity) was found in the interest mood condition, whereas any activity was absent (correlated or anticorrelated) in the anterior insula in resting-state condition. Explaining these findings, the authors suggest that the similarly anticorrelated activation in both boredom mood condition and sustained attention task condition reflects a failure in attentional engagement with the boredom-inducing stimuli. In other words, similar neuropsychological activities occur in both boredom and inattention, further suggesting that boredom reflects a failure in attentional engagement.

Moreover, in Danckert and Merrifield (2018), while self-reported boredom was comparatively low in the interest mood condition, it was consistently high across the other three conditions. Participants did not feel significantly different levels of boredom when they were watching a tedious video, when they were doing sustained attention tasks, or when they had nothing with which they could engage. This aligns with BFM, which postulates that boredom arises in an inadequate level of attentional engagement, both when one has nothing in particular to do and when one has something to do but fails to engage his or her attention. Boredom stems from the discrepancy between the desired and actual levels of attentional engagement. This suggests that even when one's attention is "objective" engaged, a discrepancy still exists if the desired level of attentional engagement is greater. This explains why people may still feel bored when they are engaged in activities that demand high levels of attention (e.g., video games or piloting military drones; Ohl, 2015).

Taken together, substantial evidence from various research methodologies supports the notion that people feel bored when there is a failure in attentional engagement. BFM further proposes that such failure reflects the discrepancy between one's desired and actual levels of attentional engagement (i.e., IAE), which is a typical condition for boredom. IAE triggers the shifts in attention which form a feedback process underlying boredom.

2.3.2 Antecedents of Boredom

Before we embark on a detailed account of where attention shifts to and of the feedback loop, we discuss what leads to IAE, and in doing so, we make the

case that the precursors to boredom commonly found in past research, such as repetitiveness and a lack of meaning in a task, are in fact precursors to IAE. Both when one has something to do or nothing in particular to do, boredom arises when there is a discrepancy between desired and actual levels of attentional engagement. Here we suggest two scenarios of boredom in terms of attentional engagement:

Scenario 1: IAE with something to do; and

Scenario 2: IAE with nothing in particular to do

Scenario 1: IAE with Something to do

When people have something to do, boredom arises when the particular situation fails to engage their attention at an adequate level. In this context, Fisher (1993) theorizes three boredom causes: external factors, internal factors, and the interaction between two. For external factors, she suggests that certain objective external features, such as constraints and low stimulation, can make a situation boring to most people, regardless of individual differences. For internal factors, keeping the situation constant, people could experience different levels of boredom due to differences in subjective states or personality traits, such as extraversion and sensation seeking. She then argues that people most likely experience boredom due to an interaction of both external and internal factors in everyday life.

Extending this, BFM specifies that, in the presence of environmental constraints (i.e., "I have to do this"), one's (i) intention to attend and (ii) attentional resource, coupled with (iii) the characteristics of the task at hand and the (iv) appraisals of them, as well as (v) other internal factors influence the level of attentional engagement and thus boredom. We do not mean to imply that these five factors form an exhaustive list of boredom antecedents. Rather, we categorize existing findings into these five main factors and postulate how they are interrelated in influencing IAE and boredom. We elaborate on each of these factors below.

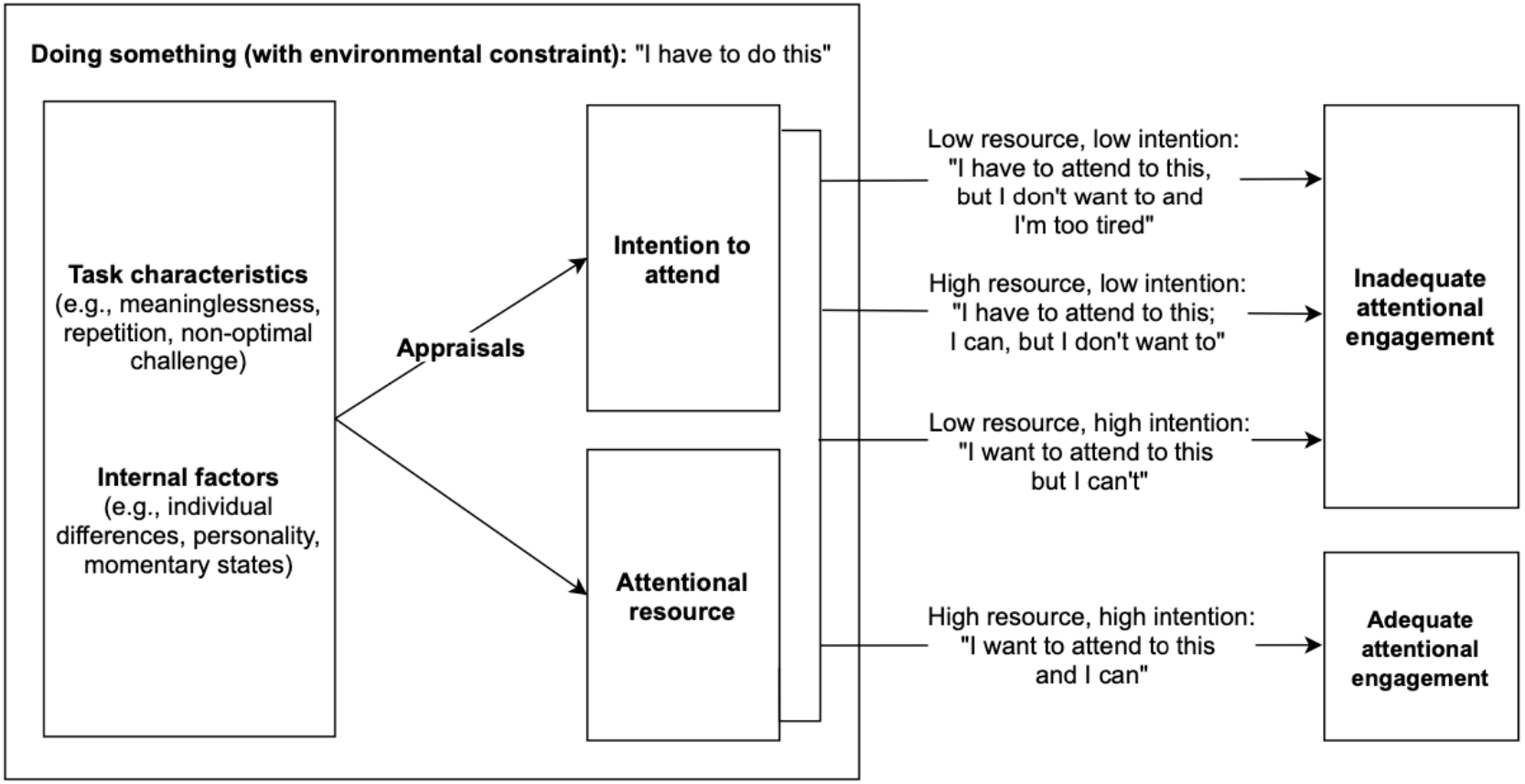
Attentional Resource and Intention to Attend. We propose that two proximal internal factors—attentional resource (i.e., can one attend to it?) and intention to attend (i.e., does one want to attend to it?)—are interrelated in determining whether one could adequately engage their attention to the task in

question. Attentional resource refers to the amount of cognitive resource one has; it is finite, it can be depleted and replenished, affecting one's ability to focus on a stimulus (e.g., Boksem et al., 2005; Franconeri et al., 2013; Johnston & Heinz, 1978; Warm et al., 2008). Intention to attend refers to the extent to which one wants to attend to the stimulus. Research on visual attention has shown that people have malleable priority and biases in directing their attention (e.g., Bisley & Goldberg, 2010; Chelazzi et al., 2014; Klink et al., 2014; Todd & Manaligod, 2018).[3]

In BFM, these two proximal factors—attentional resource and intention to attend—influence attentional engagement and the potential experience of boredom. Attentional resource and intention to attend are not orthogonal; they can influence each other. Whereas intention to attend may determine the amount of attentional resource available for a certain task, the availability of, or the demand on, attentional resource could probably also affect one's attentional intention. Indeed, mental fatigue reduces goal-directed attention, leading to automatic shifting of attention to irrelevant stimuli (Boksem et al., 2005). Figure 2.2 illustrates the interplay between these two proximal factors, as well as other internal factors, task characteristics, and cognitive appraisals, in predicting IAE.

[3] Note that intention to attend and desired level of attentional engagement are two different concepts. When one works on a task, they may or may not want to attend to it (i.e., intention to attend); they would not feel bored if they are engaged in it (i.e., actual level of attentional engagement meets the desired level). Intention to attend is task- and context-specific (e.g., in relation to a particular activity that is available in a situation). Instead, desired level of attentional engagement might vary from situation to situation or person to person (e.g., based on dispositional sensation seeking), but intention to attend can vary from potential task to potential task within a given situation.

Figure 2.2
The Interplay of Attentional Resource, Intention to Attend, and Other Factors in Influencing Attentional Engagement



Note. An illustration of how attentional resource, intention to attend, task characteristics, the appraisals of them and internal factors may interact to influence attentional engagement and thus boredom. Assuming all other external and internal factors are held constant while there is an environmental constraint that people have to attend to the current task, they would not be able to engage their attention adequately if they do not have high attentional resource *and* strong intention to attend.

Below, we further sketch four settings (high/low resource by high/low intention) that help illustrate how the two factors may interact. Each of the settings rests on two assumptions: (1) all task characteristics, appraisals, and other internal factors are held constant, and (2) there is an environmental constraint such that the person *has to* keep working on the task; otherwise, the person could redirect attention elsewhere and, provided a satisfactory source of attentional engagement is then obtained, boredom would not arise.

First, IAE may occur when a person has to but does not want to and cannot attend to the current situation (i.e., low attentional resource and low intention to attend). For example, in Boksem et al. (2005), participants had to work on a visual attention task for three hours without rest. As mental fatigue and diminished goal-directed attention took hold of these unfortunate participants, their performance on the attention task also deteriorated over time. Second, IAE may occur when people have sufficient attentional resource but are unwilling to attend to the current situation (i.e., high attentional resource and low intention to attend). An example might be attending to an uninteresting seminar after a particularly invigorating cup of coffee. Third, IAE may occur when people are willing to attend to the current task, but they are unable to (i.e., low attentional resource and high intention to attend). For instance, an exam is approaching, and a student wants to excel in it, yet she is too tired to stay focused after hours of revision. In these three settings, IAE will lead to a shift in attention, which potentially triggers boredom. The only setting that people may be able to engage attention and thus not feel bored is when they want to and have enough resource to focus on the current situation (i.e., high attentional resource and high intention to attend). As such, BFM specifies why people can feel bored not only when they want to but are unable to engage attention (Eastwood et al., 2012), but also when they do not want to—but have to—engage their attention while having their efforts in vain.

Task Characteristics and Cognitive Appraisals. The settings described above rest on the assumption that all other factors are held constant. In real life, attentional resource and intention to attend vary with task characteristics and cognitive appraisals to influence one's attentional engagement and thus boredom. Appraisals are considered central to the experience of emotion in many theories of

emotion; appraisals characterize how emotions unfold (e.g., Frijda, 1988; Lazarus, 1982; Schachter & Singer, 1962; Scherer, 2001; see a review by Moors et al., 2013). For example, whether an unpleasant situation is accompanied by low or high appraised certainty may mean the difference between the unfolding of fear versus anger (Lerner & Keltner, 2001).

Numerous studies demonstrate that boredom arises in situations that are perceived to be repetitive (e.g., Daschmann et al., 2011; O'Hanlon, 1981), uninteresting (e.g., Merrifield & Danckert, 2014), meaningless (e.g., Van Tilburg & Igou, 2012, 2017a), lacking in autonomy (e.g., Van Hooft & Van Hooff, 2018), too simple, or that are too challenging (e.g., Harris, 2000; Martin et al., 2006). For example, Smith and Ellsworth (1998) found that bored people might perceive the present situation as requiring low effort and attention. Van Tilburg and Igou (2012) also suggest the importance of interpretation of the situation for the affective experience of boredom; perceiving the situation as meaningless and finding a task not stimulating are some of the cognitive appraisals associated with boredom. In a qualitative study (Harris, 2000), participants were asked how they know they are bored. They responded that they would know by both appraisals of oneself and the external situation. They could tell that they were bored when they noticed themselves feeling restless, mind-wandering, focusing on their own mood, or when they perceived the situation as lacking challenge or things to do. Some participants reported that they never felt bored. Their boredom proneness scores did not differ from other participants. Yet, they scored significantly lower on mood monitoring, reflecting a lower tendency to direct their attention towards their affective experience. This finding suggests that how often individuals appraise their mood or situation may influence their tendency to experience boredom. BFM posits that cognitive appraisal of the situation and/or oneself plays a key role in contributing to how engaged one wants to be and how engaged she or he is, which in turn contributes to IAE. We unpack this process further.

Repetition leads to habituation, both of which have been proposed as boredom causes (O'Hanlon, 1981). Studies have demonstrated an association between perceived monotony and boredom (Daschmann et al., 2011; Perkins & Hill, 1985; Thackray, 1981). Repetitive vigilance tasks, such as monitoring the repetitive display of vertical lines (Scerbo, 1998), an air traffic control radar task

(Thackray et al., 1977), or any unusual movement of a hand moving clockwise (Ralph et al., 2017), were found to elevate boredom. However, Barbalet (1999) proposes that people do not feel bored in all monotonous activities. He suggests that an *interpretation* of the activity is required for the affective experience of boredom. Repetition increases the likelihood of perceived monotony, which lowers one's intention to attend and thus leading to IAE.

It is also well established that boredom arises when a situation lacks meaning. Research has demonstrated a robust relation between low meaning and boredom (e.g., Fahlman et al., 2009; Van Tilburg & Igou, 2012, 2017a). Further support comes from findings of a positive association between meaninglessness and boredom in people's daily experience (Anusic et al., 2017; Chan et al., 2018) and an inverse association between the valuation of academic materials and boredom (Pekrun et al., 2010). Whether a situation is meaningful is, of course, dependent on one's appraisal of it. When a situation is deemed to lack meaning, the intention to attend to it will reduce and thus lead to IAE.

Lack of perceived autonomy has been demonstrated to be associated with boredom. Van Hooft and Van Hooff (2018) provided correlational and experimental evidence for the negative association between perceived task autonomy and boredom. In academic settings, students' perception of teachers' support for their autonomy in learning is negatively associated with academic boredom (Tze et al., 2014). It can be reasoned that low autonomy, a product of cognitive appraisal, also lowers one's intention to attend, which leads to IAE.

Non-optimal challenges are also major causes of boredom (Harris, 2000; Martin et al., 2006; Van Tilburg & Igou, 2012). People experience greater levels of boredom when a task is too easy relative to their skill, such as when information learning requirements are too low (Geana et al., 2016). Contrarily, when the task is too challenging, people can also feel bored. In work settings, people experience boredom and find it difficult to sustain their attention if the tasks are simple and monotonous or too difficult (Fisher, 1987). In academic settings, being under- and over-challenged are precursors of boredom (e.g., Acee et al., 2010; Daschmann et al., 2011). The BFM posits that under-challenging or over-challenging tasks strain one's attentional resource and lowers one's intention to attend to the tasks, in turn, the level of attentional engagement.

Of course, features of the task or situation in question are not mutually exclusive. A task can be meaningless because it is too simple, whereas another task can be uninteresting because it is too difficult to comprehend. In fact, researchers have routinely manipulated some of these features in their experiments to induce boredom. For instance, in the form of behavioural tasks, boredom was manipulated by having participants copy references (Van Tilburg & Igou, 2012), count the number of letters in sentences (Van Tilburg & Igou, 2011), copy or read telephone numbers from a phone book (Mann & Cadman, 2014); in the form of video stimuli, participants were instructed to watch two men hanging laundry (Merrifield & Danckert, 2014), an 85-second clip of indoor tennis over and over again for one hour (Havermans et al., 2015; Nederkoorn et al., 2016), videos for learning fish farming (Moynihan et al., 2015) or English (A. Hunter & Eastwood, 2016; Mercer-Lynn et al., 2014). All these tasks successfully induced boredom in these experiments. These tasks are hardly interesting to participants, who likely consider (i.e., appraise) them too unchallenging and repetitive in nature, and arguably reduces one's intention to attend to them.

Notably, the aforementioned features that researchers have found to give rise to boredom are also task characteristics people find difficult to engage attention (Langner & Eickhoff, 2013; Manly et al., 2003; Robertson & O'Connell, 2010). People's vigilance, the attentional ability to maintain focused attention over prolonged periods (Warm et al., 2008), are usually tested by simple, repetitive, and uninteresting tasks (Langner & Eickhoff, 2013). In an experimental study (H. Jang, 2008), students participated in a 20-minute lesson that was pilot tested to be relatively uninteresting. The result showed that students who were provided with a rationale for putting effort into the lesson (i.e., offering tentative meaning) were significantly more engaged during the uninteresting lesson than those who did not receive the rationale.

BFM proposes that these cognitive appraisals of the situation and stimulus in question—being repetitive, uninteresting, lack of meaning, lack of autonomy, too simple, or too challenging—are features that make a situation difficult for people to adequately engage their attention, which potentially gives rise to boredom. BFM explains that when one appraises a stimulus as repetitive, uninteresting, meaningless, unchallenging or too challenging, one's intention to

attend to it will decrease. This, in turn, lowers one's actual level of attentional engagement and thus enlarges its discrepancy with the desired level of attentional engagement—hence IAE.

Internal Factors. By no means do cognitive appraisals of external situational and task-specific factors present an exhaustive list of boredom antecedents. Internal factors play a key role in the experience of boredom as well (Fisher, 1993; Martin et al., 2006; Mercer-Lynn et al., 2014). Whether a task is meaningful, interesting, or challenging is not necessarily objective or solely externally determined; it is, to a great extent, subjective. Even if a task is comprised of all those situational features and is appraised as such, internal factors could affect one's attentional engagement and thus boredom. Individual differences, such as intelligence, skills, related experience, need for sense-making, and practice, can as well influence one's perceived task difficulty (Fisher, 1993) and the response to it (Cantarero et al., 2019). The relevance of the task to one's current concerns, schema complexity, and intrinsic motivation are other possible internal factors that influence boredom (Fisher, 1993). Empirical research in this area, however, is rather scarce. Later chapters of this thesis help fill this void by investigating boredom beliefs as a form of internal antecedents.

Scenario 2: IAE with Nothing in particular to do

Boredom can also arise when people have nothing to do; in other words, when there is little in the environment or on their mind to provide adequate attentional engagement. This state of "nothing to do" does not literally mean that there is nothing one is doing; one could say that waiting, sitting, or thinking is still *doing* something. Rather, this state is akin to Brissett and Snow's (1993) description of boredom, as "an experience of 'not fitting in,' of 'not knowing what to do,' of 'not wanting to do anything,' or simply not being ready (or poised) to do anything" (p. 238). From the narrative reports of work boredom (Fisher, 1987), "having nothing to do" was most often identified as a precursor of boredom at work. Likewise, in Harris (2000), "lack of things to do" and "having to wait" were reported as two of the most frequent causes of boredom. Aligned with these qualitative findings, an experience-sampling study (Chin et al., 2017) showed that doing nothing in particular, is one of the activities that correlated with the highest ratings of boredom; also, participants were most frequently bored when they were

in medical facilities and airports, where people arguably have little to engage their attention with. According to BFM, when people desire to be engaged (i.e., high desired level of attentional engagement), they may feel bored when they have nothing in particular to engage with (i.e., low actual level of attentional engagement). This constitutes IAE. In this state of "nothing to do," they have the free time and autonomy to choose what they do (i.e., an absence of constraint), but they do not know what they want to do (i.e., an absence of the desired target of engagement).

To sum up the section on the antecedents of boredom, boredom can arise both when people have something or nothing to do. What is crucial is that, in both cases, the discrepancy between desired and actual attentional engagement may bring about boredom. When one has something to do, task characteristics and the appraisals of them (e.g., perceived repetition, meaninglessness, lack of interest, non-optimal challenge), coupled with the intention to attend, attentional resource, and other internal factors, affect one's desired and actual levels of attentional engagement. When the discrepancy reaches a noticeable threshold, boredom may engender.

2.3.3 Experiences of Boredom

When people are bored, they experience feelings of unpleasantness (Eastwood et al., 2012; Smith & Ellsworth, 1985; Van Tilburg & Igou, 2017a), restlessness, and lacking challenge (Van Tilburg & Igou, 2012, 2017a). They also experience time passing slowly (Harvey & Monello, 1974; Martin et al., 2006). Boredom is a state of non-optimal arousal, possibly fluctuating between low (Mikulas & Vodanovich, 1993; Van Tilburg & Igou, 2017a) and high arousal responses (Merrifield & Danckert, 2014). It is noteworthy that attentional engagement is related to each of these experiential components of boredom, discussed extensively in Eastwood and colleagues' seminal review (2012).

2.3.4 Consequences of Boredom

In BFM, when bored, a person's attention would either shift outwards, inwards, or back to the source of boredom. This attention shift highlights how boredom serves a self-regulatory function of maintaining adequate attentional engagement and how it acts as a motivational force driving people to pursue something more meaningful, satisfying, or fulfilling (Elpidorou, 2018b; Van

Tilburg & Igou, 2019). People's attention may shift out to external things that are unrelated to the source of boredom (i.e., the boring situation or the stimulus), shift inwards (e.g., mind-wandering, self-reflection), or shift back to the source of boredom. These three routes are not mutually exclusive. For example, people's attention could shift inwards, pondering on the task's meaning, and then shift out, switching to do a different task that is more meaningful or rewarding. People could also mind-wander and fiddle with their smartphones at the same time.

Attention Shifts Out

Boredom often accompanies a strong desire to escape from the boring situation (Smith & Ellsworth, 1985) to do something different (Van Tilburg & Igou, 2012). In Barbalet's (1999) theoretical account, boredom is a feeling that gives rise to curiosity and invention in the quest for novelty, variety, and meaning. When bored, people's attention may shift "outwards" to explore or look for more rewarding activities. This is supported by subsequent empirical research; boredom promotes exploration (Geana et al., 2016), curiosity (Lomas, 2017), and creativity (Mann & Cadman, 2014; Park et al., 2019). Likewise, boredom proneness also predicts exploration (J. A. Hunter et al., 2016).

Apart from the above, boredom drives people to seek stimulation, excitement, or challenge. Finding alternative activities is reported as the most common boredom coping method (Martin et al., 2006). People may stave off boredom through reading, socializing, watching TV, or physical exercises (Harris, 2000). In a boring lecture, one might cope with boredom by chatting with a neighbour, texting, doodling, or physically leaving (Mann & Robinson, 2009; Sharp et al., 2017). Several experimental studies found that boredom significantly promoted snacking behaviour (e.g., Havermans et al., 2015). To disrupt tedium, bored participants consumed more *exciting* snacks, such as cherry tomatoes and sweets, instead of crackers (Moynihan et al., 2015). Bored participants even went for self-administering electric shocks (Havermans et al., 2015) and took more risks (Kılıç et al., 2020), with higher frequency and intensity than less bored participants (Nederkoorn et al., 2016). In line with these, boredom proneness was shown to be associated with emotional eating (Crockett et al., 2015), binge drinking (Biolcati et al., 2016), and gambling (Mercer & Eastwood, 2010).

People also react to boredom at a more symbolic level in search of meaning. Boredom was found to promote the evaluation of ingroup/outgroup (Van Tilburg & Igou, 2011), polarization of political orientation (Van Tilburg & Igou, 2016), and intentions to perform prosocial behaviours (Van Tilburg & Igou, 2017b). Boredom proneness is associated with increased level of search for meaning in life, and thus more positive perception of heroes (Coughlan et al., 2019).

Attention Shifts Inwards

Contrary to an outward direction of attention, people may shift their attention inwards in response to boredom. This may especially be salient when people are restricted from doing something other than the current task. Respondents in Harris (2000) reported thinking or daydreaming as a usual strategy for coping with boredom. When people are bored, they mind-wander (Kane et al., 2007), engage in self-exploration (Lomas, 2017), daydream (Mann & Robinson, 2009; Pekrun et al., 2002; Sharp et al., 2017), or retrieve nostalgic memories (Van Tilburg et al., 2013).

Attention Shifts Back

Another response to boredom is to actively approach it by cognitively reappraising or behaviourally changing the boring situation. Cognitive reappraisal—the changing of one's subjective evaluations towards a situation—has been richly documented in the emotion regulation literature (e.g., Gross & John, 2003; McRae et al., 2012). To remedy boredom, people may refocus their attention on the task at hand (Harris, 2000) with effort (O'Hanlon, 1981), or employ strategies to transform a boring task into something more interesting (Sansone et al., 1992). Likewise, in educational settings, students may remind themselves of the importance of the lesson or ask their teacher for more interesting tasks to re-engage their attention (Nett et al., 2010). In a longitudinal study (Webster & Hadwin, 2015) examining students' strategies to regulate boredom while studying, three of the most frequently reported strategies were goal management, focusing on the task, and reminding oneself of the consequences for not finishing the task. More specifically, students would take breaks, modify their approach to tackle the task, or administering rewards for completing it. It appears that these strategies for regulating boredom help direct

people's attention back to the task by either changing or breaking it down for easier cognitive processing or reappraising its values, and thus increasing one's intention to attend. These strategies target the earlier discussed antecedents of boredom by making a task more interesting (Sansone et al., 1992) or more meaningful (Nett et al., 2010; Webster & Hadwin, 2015), both of which likely increases one's intention to attend. Alternatively, one could take a break, which helps replenish the needed resource to engage their attention back to the task.

Based on the literature on where attention shifts to in response to boredom, we propose that the three aforementioned consequences of boredom—attention shifting out, inwards, and back—are driven by the goal of reducing the discrepancy between the desired and actual levels of attentional engagement. Nevertheless, it is hard to predict where attention would go in a given setting. This is due to three main reasons. First, how one copes with boredom depends on a wide variety of factors, such as personal preferences (Martin et al., 2006), situational features like perceived causes of boredom, situational constraints, or the perceived value in persisting in the current task (Fisher, 1993). Being in class, at work, on a long-haul flight, or, perish the thought, somewhere without Wi-Fi would reduce one's options for boredom coping. Second, where attention shifts may not be the result of conscious choice. It can be intended or unintended; for example, people may not intentionally mind-wander. Third, it is uncertain whether these responses to boredom are out of a drive to escape, seek stimulation, regain meaning, or a mixture of the above.

2.3.5 Feedback Loop

BFM specifies that when bored, one's attention may either shift out, shift inwards, or shift back to the source of boredom. If where attention lies sufficiently engages their attention, boredom diminishes at that moment. This lasts until their attention shifts away again due to IAE, returning to the beginning of the model. The model also specifies that the amplification of boredom, both in terms of frequency and intensity, is in part due to learning; that through classical and operant conditioning, both the cues that elicit boredom and their consequence become generalised. Below, we unpack this point further. The above processes form a feedback loop that may explain boredom's dynamic nature and fluctuation over time (Mills & Christoff, 2018; Van Tilburg & Igou, 2017a) and how

boredom serves a self-regulatory function of maintaining an adequate attentional engagement. Consistently, empirical findings using the Sustained Attention to Response Task showed that attentional errors were correlated with levels of boredom reported *both* before and after completing each block (A. Hunter & Eastwood, 2016). This suggests a dynamic relationship between attention and boredom, such as the feedback loop specified in BFM. The feedback loop of shifting attention is a novel proposition and the central component of BFM as it offers possible explanations for the five central unresolved issues in the literature.

2.4 Boredom Feedback Model's Answers to the Five Unresolved Issues

We raised five open questions in the empirical literature for which we claimed our model could explicate, integrate, and offer a way forward. First, how people learn to cope with boredom? Second, how do boredom and self-control relate to one another? Third, what are the relationships between attention, meaning, and boredom? Fourth, why has boredom been found to co-occur with different high- or low-arousal negative feelings? Fifth, what forms chronic boredom? Below we apply the model to each of these five questions and elaborate on its theoretical implications.

2.4.1 Implications for Boredom Coping

BFM, especially its feedback loop, provides fundamental insights into boredom coping, offering possible explanations for the development of maladaptive behaviours (e.g., obsessive smartphone use; Elhai et al., 2018) in regulating boredom. BFM proposes that people learn how to cope with boredom in a more effective (not necessarily adaptive) manner through a trial-and-error process, testing which strategies can bring adequate attentional engagement and exit of the loop. However, if the loop runs for some time, that is, if people keep on trying to engage their attention yet failing to do so, we propose that the feeling of boredom may amplify by the process of operant and classical conditioning. When people employ a particular avoidance strategy (*attention shifts out*; e.g., pulling out their smartphones) that successfully lowers state boredom, the strategy is negatively reinforced. This, over time, increases the likelihood of using the same strategy and may lead to a generalised pattern of experiential avoidance of state

boredom. The model further speculates that, in the longer-run, the drop in attentional engagement becomes the conditioned stimulus sufficient to trigger avoidance, the conditioned response. For example, people may pull out their smartphones to avoid the potential experience of boredom once their attentional engagement drops, irrespective of their actual level of boredom.

2.4.2 Implications for the Relation of Boredom and Self-control

Boredom seems to be closely related to self-control. Frequent experience of it is linked to impulsivity (Mercer-Lynn, Hunter, et al., 2013) and a range of impulsive behaviours such as risky driving (Oxtoby et al., 2019), binge drinking (Biolcati et al., 2016), and emotional eating (Crockett et al., 2015; Mercer-Lynn, Hunter, et al., 2013). Situationally, bored people are more likely to take risks, even for those with high trait self-control (Kılıç et al., 2020). There is an emerging discourse on the relationship between boredom and ego-depletion (e.g., Francis et al., 2018; Inzlicht et al., 2014; Milyavskaya et al., 2019). In the only review thus far that attempted to provide an integration of these two lines of research, Wolff and Martarelli (2020) propose that boredom may confound the results in ego-depletion research by placing an unwanted self-control demand and instigating behavioural change. In what follows, we highlight the implications of BFM on the relationship between boredom and self-control.

Ego-depletion research suggests that acts of self-control at Time 1 give rise to a subjective experience of mental effort and impair the performance in subsequent, unrelated self-control tasks at Time 2 (e.g., Hagger et al., 2010; Muraven & Baumeister, 2000). There are several accounts for this phenomenon. The strength model of self-regulation (Baumeister et al., 2018; Baumeister & Vohs, 2016) posits that self-control failure is rooted in the depletion of limited resources of energy, similar to the limited resources that are available to a muscle. Alternatively, the process model (Inzlicht et al., 2014; Inzlicht & Schmeichel, 2012) posits that apparent self-control failure in allocating cognitive effort to tasks results from shifts of priorities from “have-to” to “want-to” goals affecting shifts in attention, emotion, and motivation. The construal-level account of self-control (Fujita, 2008; Fujita et al., 2006) suggests that high-level construals of a situation, compared to low-level construals, facilitate self-control. Despite the ongoing debates regarding existing models (Baumeister et al., 2018; Friese et al., 2019),

our model is able to offer explanations for the relationship between boredom and self-control by integrating crucial elements of these self-control models.

To recapitulate, BFM conceptualizes boredom in terms of shifting attention in the form of a feedback loop. It highlights the importance of appraisal in the unfolding of boredom. Here we illustrate the relationship between boredom and self-control with a hypothetical scenario: a person had to grade some assignment (first self-control task) and then prepare teaching materials (second self-control task). When they were grading the assignment, they failed to engage their attention on it; they felt bored and tried to direct their attention back on the task by reminding themselves of the deadline (i.e., the first feedback loop). They continued to feel bored over time and struggled to direct their attention back to grading (i.e., experiencing the feedback loop a number of times consecutively). We theorize that this continual direction of attention back to the current task (rather than directing attention inwards or outwards) in the feedback loop of boredom would impair self-control over time.

There are three possible explanations for this. First, such redirection of attention (back to the task) in itself is an act of effortful attention control. Based on the strength model (Baumeister & Vohs, 2016), such effortful attention control undermines subsequent self-control by depleting the resources for it (see a review by Schmeichel & Baumeister, 2010). With a reduced capacity of self-control, the person would perform poorer in the subsequent task. Second, based on the process model (Inzlicht et al., 2014; Inzlicht & Schmeichel, 2012), the feedback loop over time might increase the difficulties in exerting self-control due to a shift in attention from the current "have-to" task towards "want-to" goals. Consistent with this, whereas exercising self-control was shown to increase attention towards reward-related stimuli (Schmeichel et al., 2010), neuropsychological evidence suggests that boredom leads to a sense of fatigue and heightened reward sensitivity (Milyavskaya et al., 2019). When the person tried to prepare teaching materials (i.e., the second self-control task), they might fail to notice cues signalling the need to control as they had directed their attention towards rewarding possibilities, failing in self-control (Inzlicht & Schmeichel, 2012). Unhealthy snacking is an example of rewarding possibilities; both bored (Havermans et al., 2015; Moynihan et al., 2015) and depleted (Haynes et al.,

2016) participants were found to consume a greater amount of unhealthy snack. Third, based on the construal-level account (Fujita, 2008; Fujita et al., 2006), if the person focused on their feelings of tiredness and the limited resources they had for preparing teaching materials (the second self-control task), which is a low-level construal, they would exert less self-control (Bruyneel & Dewitte, 2012; Kim et al., 2015). If, however, they reminded themselves of the goals or the importance of preparing teaching materials as a responsible teacher, which is a high-level construal, they might be able to exert greater self-control (Agrawal & Wan, 2009; Fujita et al., 2006; Schmeichel & Vohs, 2009; E. W. Wan & Agrawal, 2011) and experience a lower level of boredom (Nett et al., 2010, 2011), which, according to BFM, can be attributed to a higher intention to attend and corresponding attentional engagement.

In short, according to BFM, the feedback loop of attention-shift in boredom might impair self-control over time through depleting resources (strength model, Baumeister & Vohs, 2016) or shifting the attention away from the need to control towards reward possibilities (process model, Inzlicht & Schmeichel, 2012). Since appraisals inherently influence attentional engagement and thus the experience of boredom in BFM as well as for exerting self-control (construal-level account, Fujita et al., 2006), high-level (vs. low-level) construals could promote self-control and reduce boredom. To clarify, we are not suggesting that every instance of boredom involves self-control or every occasion of self-control would eventually lead to boredom. We instead theorize that, since the two seem to build on basic attention processes, they may co-occur under certain circumstances. Specifically, we argue that the direction of attention back to the task in the feedback loop of boredom may trigger unsuccessful self-control; instead, the replenishing of cognitive resources and some form of reappraisal (e.g., reward, construal-level) might yield better results.

One insight our model might offer the research on ego-depletion is the distinction we make between engagement and effort. Ego-depletion has been suggested to result from prior self-control effort, which depletes resources (Baumeister & Vohs, 2016) or motivates shifts in motivation and attention (Inzlicht & Schmeichel, 2012). In BFM, IAE instigates the effortful redirection of attention back to the task at hand, which may then impair subsequent self-control

through resource depletion or shifts in motivation and attention. In this sense, ego-depletion might result from the failure to attain adequate attentional engagement rather than prior self-control effort. This possibility has been hinted at in past research, where mental effort was argued to result from a computation mechanism that assesses the opportunity cost of *engaging* in the current task (Kurzban et al., 2013), or from *sustaining focused attention* during self-regulation (Molden et al., 2016, 2017).

We note that these are theoretical suppositions that require future empirical tests. In addition, given that boredom may co-vary with ego-depletion manipulations research (e.g., Milyavskaya et al., 2019; Wolff & Martarelli, 2020), further work is needed to disentangle the two and elucidate their relationship.

2.4.3 Implications for the Relationships between Meaning, Attention, and Boredom

Attention and meaning often feature in boredom research. In fact, the low attention and lack of meaning that characterize boredom distinguish it effectively from other emotions across the levels of concept, state, and individual differences (Van Tilburg & Igou, 2017a). However, thus far, only one theoretical model, MAC model (Westgate & Wilson, 2018), has explicitly postulated the relationship between meaning, attention, and boredom. Compared with MAC model, BFM takes a different stance on how they relate. Whereas MAC model suggests that people experience "meaningless boredom" when they are engaged in something with little meaning, BFM postulates that it is likely impossible for people to feel bored while being adequately engaged in something. Whereas MAC model proposes meaning and attention as two independent determinants of boredom, BFM argues that perceived meaningfulness is a precursor to IAE and hence boredom; BFM's position appears to be supported by Westgate and Wilson's (2018) experimental evidence showing that the meaning manipulation had a significant main effect on attentional difficulties; that is, the two are not orthogonal. BFM explains that the meaning manipulation changes one's intention to attend and thus attentional difficulties.

It is important to note that the present synthesis does not downplay the significance of meaning in the affective experience of boredom. In fact, it highlights the centrality of this existential component in boredom. Functional

accounts of boredom suggest that boredom signals the meaninglessness of the current situation and motivates people to engage in something more meaningful (Elpidorou, 2014; Van Tilburg & Igou, 2017b). The emotion informs people that their cognitive resources are not engaged (Danckert, Mugon, et al., 2018; Eastwood & Gorelik, 2019). BFM is not only in line with, but also complementary to, these accounts by highlighting the role of attention-shift in self- and behavioural-regulation. Given that attention is a limited and valuable resource that reflects where people's time and energy are spent, boredom can prompt people to allocate their attention to something more meaningful (i.e., rewarding in the broad sense). To master a skill, attention has to be devoted to practicing; to develop an interpersonal relationship, attention has to be placed on social interaction and communication; to process information, attention is needed. Boredom serves a vital function of prompting individuals to direct their attention to and engage in something that is of value.

2.4.4 Implications for the Relationships between Boredom and Other Emotions

Boredom can co-occur with other emotions, and it has been found to correlate with both high-arousal ones such as anxiety, anger (Fahlman et al., 2013; Van Tilburg, Bruder, et al., 2019), and frustration (Havermans et al., 2015; Perkins & Hill, 1985), as well as low-arousal states like fatigue (Havermans et al., 2015) and loneliness (Tam & Chan, 2019). A study found that boredom was associated with higher levels of frustration when perceived task autonomy was low, and it was associated with a more intense depressed mood when perceived autonomy was high (Van Hooft & Van Hooff, 2018).

Whether boredom itself is a high or low arousal emotion remains a contested question. Theoretically, boredom was defined as a state of low arousal by some researchers (Baratta & Spence, 2018; Mikulas & Vodanovich, 1993), but defined with its characteristics of irritability and restlessness by others (Barbalet, 1999). Indeed, some studies suggested boredom is a low arousal state (Smith & Ellsworth, 1985; Van Tilburg & Igou, 2017a; Yik et al., 2011), while others suggested it as a high or mixed-arousal state (Merrifield & Danckert, 2014). There is also evidence showing that boredom is both a high and a low arousal state (Danckert, Hammerschmidt, et al., 2018). The Multidimensional State Boredom

Scale (Fahlman et al., 2013) has subscales on "agitated affect" and "dysphoric affect." Given the mixed findings, researchers have suspected that different arousal level may suggest the existence of different types of boredom (Goetz et al., 2014), or it occurs at different temporal stages of state boredom (Eastwood et al., 2012; O'Hanlon, 1981; Van Tilburg & Igou, 2017a). Bored people may fluctuate between low and high arousal, at a level of non-optimal arousal (Martin et al., 2006).

BFM hypothesizes that if the feedback loop of the model is repeated without resolve, that people keep struggling to attain an adequate level of attentional engagement to no avail, other emotions would arise. Disengagement is unpleasant and aversive (Eastwood et al., 2012); repeated failed attempts might result in high arousal (e.g., frustration, anger, anxiety), or low arousal reactions (e.g., apathy, sadness). If people direct their attention to ruminate on negative thoughts or life experiences when feeling bored, low arousal reactions (e.g., sadness, worry) might arise. If they turn to others, such as reaching out to friends, to cope with their state of boredom only to realize the discrepancy between their actual and desired interpersonal relationships, this might give rise to loneliness (Peplau & Perlman, 1979). Whether boredom results in high-arousal (e.g., frustration, restlessness, irritability) or low-arousal (e.g., sadness, loneliness) responses probably depends on where their attention is directed. This postulation, and more generally BFM, helps shed light on the mixed findings on boredom as a high or low arousal emotion, as well as the co-occurrence of boredom with other emotions. Previous accounts do not interpret these findings as a result of a feedback loop or integrate them in a mechanistic account of shifting attention.

2.4.5 Implications for Chronic Boredom

Above, we discussed the short-term consequences of the feedback loop of the model. We now turn to its long-term consequences: chronic boredom. Long-term boredom and people's propensity for boredom have been conceptualized as *boredom proneness* (Farmer & Sundberg, 1986). The accuracy and appropriateness of this conceptualization are debated (e.g., Gana et al., 2019), but, for the purpose of our discussion, it suffices to underscore that the construct is associated with an array of health and at-risk behaviours, such as depressive symptoms (Fahlman et al., 2009; Goldberg et al., 2011; Malkovsky et al., 2012),

anxiety (Fahlman et al., 2009), apathy, anhedonia (Goldberg et al., 2011), binge drinking (Biolcati et al., 2016), and problematic Internet use (Skues et al., 2016). Given substantial evidence on the relationship between chronic boredom and well-being, it is important to understand what makes one chronically bored, whereby we may develop potential interventions.

BFM may help provide insights on this. Chronic boredom may result from dysfunction of the regulatory feedback loop, that people repeatedly fail to attain adequate attentional engagement and thus being stuck in the loop for prolonged periods of time. This is consistent with Elpidorou's (2018a) proposition that boredom proneness may be a dysfunction of state boredom, as well as Struk and colleagues' (2017) suggestion that the construct "is characterized by an individual's capacity (or failure) to engage in sufficiently satisfying activities" (p. 356).

What keeps people from attaining adequate attentional engagement? BFM further suggests that it can be attributed to two main factors, trait-like attentional factors and long-term influences. Chronic boredom is likely influenced by trait-like factors (e.g., chronic weakness of attention systems, chronic hyposensitivity, or hypersensitivity to stimulation; Eastwood et al., 2012), which may affect especially whether attentional resource is available. We also emphasize that other long-term influences that are indirectly related to attention processes likely exist as well, such as whether one appraises regular tasks, as well as the enduring situations these tasks occur in (e.g., routine activities in one's job), as valuable (e.g., instrumental to desired career progress) that is worth their attention. Such factors may relate to what one *wants* to engage in their lives, including searching for such activities, and identifying obstacles. Such differentiation has not been made by past researchers. Both trait and long-term factors can sustain the feedback loop, leading to the prolonged experience of boredom.

In terms of trait attentional factors, research shows that there are individual differences in the ability to sustain attention (e.g., Gaertner et al., 2008; van de Weijer-Bergsma et al., 2008) or to regulate attention allocation with attention shifting and attention focusing (i.e., attentional control, e.g., Derryberry & Reed, 2002; Posner & Rothbart, 2000); these trait factors would probably affect how likely a person feels bored across different settings. A wealth of evidence has

demonstrated the relationship between trait boredom and inability to sustain attention (Cheyne et al., 2006; Ferrari, 2000; Gerritsen et al., 2014; A. Hunter & Eastwood, 2016; Malkovsky et al., 2012; Struk et al., 2017). Further evidence comes from the findings that boredom proneness is associated positively with mind-wandering (Isacescu et al., 2017; Struk et al., 2017) and negatively with flow proneness (Harris, 2000).

BFM also suggests that chronic boredom might reflect a relatively unattainable desired level of attentional engagement. The model postulates that IAE is the discrepancy between desired and actual levels of attentional engagement. If one's desired level is unrealistically high, one might be prone to boredom because such desire is not satiable, even if one's attention seems objectively engaged. Why would one's desired level of attentional engagement be unrealistically high requires further research, but one potential mechanism might be chronic exposure to rewarding tasks that demand high attentional engagement. This is akin to the allostasis load in the stress and homeostasis literature (e.g., McEwen, 2006).

Other than trait attentional factors, BFM suggests that some factors that constituted "trait boredom" in prior research are, in fact, long-term factors that are not ingrained in one's personality. If people do not know what they want to engage in their lives in general or do but cannot engage in them, they will experience chronic boredom. In other words, their desired level of engagement is continuously or frequently not met. These long-term factors are malleable and can be intervened. For instance, a person may experience chronic boredom as they find their job immensely boring. Their inability to identify alternative careers that are compelling to them (i.e., not knowing what one wants) or a weak economy with limited job opportunities (i.e., not being able to pursue what one wants due to obstacles) could prolong their boredom in life. Congruent with our argument, whereas an increase in life meaning predicted a decrease in boredom proneness in a longitudinal study (Fahlman et al., 2009), in a qualitative study (Bargdill, 2000), people expressed becoming chronically bored when they had compromised their life goals for less desirable ones. This kind of long-term boredom could potentially be ameliorated through searching for life purpose and engaging in something meaningful. This helps explain the findings that boredom proneness

can actually fluctuate and change over time (Fahlman et al., 2009; Martin et al., 2006).

Trait-like attentional factors and long-term factors are not differentiated by their malleability; attention ability can be improved by attention training (e.g., Peng & Miller, 2016; Tang & Posner, 2009), and long-term factors can be changed (e.g., finding life goal, quitting a boring job). Neither are they demarcated as internal vs. external factors; while trait-like attentional factors are internal, long-term factors can also be internal (e.g., lack of life goal) or external (e.g., a repetitive job). A simpler way to interpret their difference is that one is trait-like attentional factors the other is not. We argue that, given the importance of adequate attentional engagement in the experience of boredom, it is helpful to differentiate trait-like attentional factors from other possible long-term factors which influence chronic boredom. Such differentiation has an important implication: it suggests novel predictions on potential intervention for chronic boredom.

BFM hypothesizes that attention training would reduce the frequency of boredom for those who are chronically bored due to attentional trait factors, while finding satisfactory life engagement or removing obstacles for such search would ameliorate chronic boredom for those who are bored frequently due to long-term factors. We speculate that specific interventions targeting these two general factors would be more effective in reducing chronic boredom and, hopefully, its accompanying psychological issues. Lee and Zelman (2019) provide preliminary evidence that dispositional mindfulness moderates the relationship between boredom proneness and well-being, that boredom proneness was associated with symptoms of depression, anxiety, and stress only among those who scored low in the tendency to focus one's attention on the present measured with the Act with Awareness subscale of the Five Facet Mindfulness Questionnaire. In other words, the detrimental effect of boredom proneness on psychological health is only salient among those who are less able to engage attention.

2.5 The Explanatory Advantages of BFM

BFM does not seek to substitute past work but rather to supplement it as part of an integrative account, through which it proposes possible explanations towards the five questions regarding boredom that existing theoretical models

may not have very effectively addressed. A thorough comparison of all theoretical models of boredom is beyond the scope of the present review. Below we highlight some of the key similarities and differences of our model and related models.

We view BFM as consistent with the functional models (Bench & Lench, 2013; Elpidorou, 2018b; Van Tilburg & Igou, 2012). We emphasize the regulatory function brought by shifting attention in boredom in particular. While Elpidorou's (2018b) meta-model focuses on the experience of boredom and its function, BFM explains the dynamic, multi-component process of boredom from its antecedents, experiences, consequences to its feedback loop.

Multiple attentional accounts (e.g., Eastwood et al., 2012; Fisher, 1998; Leary et al., 1986) underscore the pivotal role of attention for boredom; however, they focus less on the antecedents and consequences of failed attention and the existential approach of boredom (Westgate & Wilson, 2018). Eastwood and colleagues emphasized the presence of a subjective unfulfilled desire (2012) and unfulfilled cognitive potential (2019) for the experience of boredom. However, thus far, none of these theories have conceptualized boredom in a process account of attention-shift. Integrating research findings on the antecedents, experience, and consequences of boredom, BFM proposes a dynamic process of shifting attention in the form of a feedback loop. The model emphasizes that IAE is a typical condition for boredom and offers novel predictions for the five unresolved issues.

Compared with MAC model (Westgate & Wilson, 2018), BFM has a different conceptualization of the relationships between attention, meaning, and boredom. Whereas MAC model suggests that attention and meaning are independent determinants of boredom and that lack of attention is sufficient but unnecessary for boredom; BFM posits that IAE is a typical condition for boredom, and that lack of meaning contributes to IAE and thus boredom. Therefore, according to BFM, it is impossible for people to be adequately engaged in something—meaningful or not—while at the same time feeling bored. If people are working on a goal-incongruent (e.g., meaningless) activity but are able to engage their attention on it, they will not feel bored until their attention fades. This is what many previous studies have invariably demonstrated (Danckert & Merrifield, 2018; A. Hunter & Eastwood, 2016; Merrifield & Danckert, 2014).

We acknowledge that these differences between MAC model and BFM might be attributable to the differences in how engagement is defined. Whereas Westgate and Wilson (2018) define cognitive engagement as "the result of successful attentional fit, which occurs when cognitive demands are balanced by available mental resources" (p. 693), we define IAE as the gap between one's objectively measurable level of attentional engagement and subjectively desired level of attentional engagement.

To our knowledge, Westgate and Wilson (2018) is the only study that directly tested potential interactive effects of attention and meaning. We have reservations regarding the conclusiveness of evidence on the potentially orthogonal nature of attention and meaning. Specifically, in their meta-analysis (Study 1, Westgate & Wilson, 2018), "attention" was operationalized as participants' tendency to focus on their thoughts, which seems to be more akin to mind-wandering than the typical task-related attention measures used to investigate boredom—such as sustained attention tasks (e.g., Danckert & Merrifield, 2018; A. Hunter & Eastwood, 2016). In their experimental study (Study 2, Westgate & Wilson, 2018), while the attention manipulation had a main effect on attention difficulties but not meaning, the meaning manipulation had significant effects on both meaning and attentional difficulties. This finding seems to be consistent with our argument that meaning could be a precursor to attentional difficulties, and thus boredom. Considering these methodological limitations and findings in the studies, the relationship between boredom, meaning, and attention proposed by MAC model is not unequivocal. Whereas MAC model proposes that meaning and attention play orthogonal roles, BFM proposes that they are interrelated in the dynamic process of boredom and that boredom experiences tend to be characterized by low attention. Low meaning influences how much one intends to engage their attention, which in turn affects the degree of attentional engagement. In other words, the two are not typically separable. These are testable, competing hypotheses; future research is needed to resolve this debate.

A theoretical model with a more specific focus in the academic context is presented by Pekrun (2006), the control-value theory of achievement emotions. It accounts for a number of emotions in academic settings, with boredom included

as one of them. The theory posits that the appraisals of subjective control over achievement activities and their outcomes and the subjective values of them are central to achievement emotions. Boredom is experienced if the current activity lacks value and possesses a mismatch in the task demand and individual capabilities, either when the task demand exceeds individual capabilities (i.e., low control) or when it is lower than individual capabilities (i.e., high control). BFM is in line with Pekrun's (2006) control-value theory, which proposes how value and control appraisals give rise to boredom. BFM further incorporates appraisal into the attentional mechanism and underscores its importance and in relation to the intention to attend in particular.

2.6 Summary

Attentional processes under boredom are complex and dynamic. We present the Boredom Feedback Model to integrate diverging findings in the empirical study. The model conceptualizes boredom as characterized by a mechanism of shifting attention (Figure 2.1); attentional engagement at an inadequate level is a typical condition for the experience of boredom. Feeling bored, people's attention shifts outwards, inwards, or back to the boring situation. If where attention lies is not adequately engaging, the model starts from the beginning in the form of a feedback loop. While this loop may direct attention towards meaningful pursuit, if it runs for some time without resolve, it potentially brings adverse outcomes. Our model posits that, in the short term, boredom might amplify through operant and classical conditioning, elicit other negatively valenced emotions, contribute to fluctuating levels of low- or high-arousal responses, and impair self-control under specific circumstances; in the long term, chronic boredom may develop into clinical issues or maladaptive behaviours. The model was designed to enhance our understanding of boredom concerning dynamic attentional processes and to inspire future research, including the ones presented in this thesis.

Chapter 3

An Empirical Investigation of Boredom Proneness[4]

3.1 Introduction

Before understanding people's lay beliefs about boredom, we need to first examine what boredom is, as momentary state and as chronic experience. In the previous chapter, we proposed a theoretical model and reviewed existing findings with a focus of state boredom. In the current chapter, we focus on boredom as a chronic experience. While consequences of state boredom can span positive and negative domains, researchers have proposed that experiencing boredom more chronically tends to have primarily negative impacts on well-being (e.g., Fahlman et al., 2009; Goldberg et al., 2011). In this context, researchers have devoted considerable effort to investigating the trait-like construct *boredom proneness*, or the general tendency towards experiencing boredom (elaborated below; Farmer & Sundberg, 1986).

Despite research consistently showing its association with indicators of poorer well-being, boredom proneness remains rather scantily understood and conceptualized. This may be due to both the absence of a theoretical foundation (Mercer-Lynn et al., 2014; Mercer-Lynn, Flora, et al., 2013) and problems in assessment (Gana et al., 2019; Struk et al., 2017). Both concerns have been longstanding (Vodanovich, 2003). Given the accumulating evidence for the clinical and broader psychological relevance of boredom proneness, a critical evaluation of this concept, as measured by the Boredom Proneness Scale (BPS), backed by empirical evidence, is warranted. This chapter set out in pursuit of this goal.

3.1.1 Boredom Proneness and its Conceptual Ambiguity

Boredom proneness refers to one's general tendency to experience boredom (further elaborated below; Farmer & Sundberg, 1986). People who are

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[4] This chapter is based on a published article:

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

high in boredom proneness are less capable of maintaining sustained attention (Isacescu et al., 2017; Malkovsky et al., 2012), more impulsive (Mercer-Lynn, Flora, et al., 2013), and see less purpose in life (e.g., Fahlman et al., 2009; Goldberg et al., 2011). The importance of boredom proneness has been borne out in substantial empirical evidence that suggests its linkages with mental health issues (e.g., symptoms of depression and anxiety; Elhai et al., 2018; Fahlman et al., 2009; Goldberg et al., 2011; Lee & Zelman, 2019; Sommers & Vodanovich, 2000) and problematic behaviours (e.g., binge drinking, problematic smartphone use; Al-Saggaf et al., 2019; Biolcati et al., 2016; Crockett et al., 2015; Elhai et al., 2018; Ksinan et al., 2019; Mercer-Lynn, Flora, et al., 2013; Oxtoby et al., 2019; Skues et al., 2016; Wolniewicz et al., 2020). It was also suggested to be an obstacle to flourishing (Elpidorou, 2017) and is even linked with mortality (Britton & Shipley, 2010; Maltsberger et al., 2000).

Despite the relations that boredom proneness holds with well-being, there has been persisting ambiguity in the theoretical characterization of the construct and recurring criticism over its measurement (see Struk et al., 2017; Vodanovich & Watt, 2016, for reviews). The initial definition of boredom proneness by Farmer and Sundberg (1986) held that it is "the tendency towards experiencing boredom" (p. 14) and it "emphasizes one's connectedness with one's environment on many situational dimensions, as well as the ability to access adaptive resources and realize competencies" (p. 10). To measure this phenomenon, they developed a self-report instrument, the Boredom Proneness Scale (BPS), which has since been widely administered (for details, see Struk et al., 2017; Vodanovich, 2003). As of writing, the original paper has been cited over 470 times.

Vodanovich and colleagues (2005) later suggested that external stimulation (the "perception of low environmental stimulation") and internal stimulation ("one's inability to generate interesting activities," p. 296) are two common factors that emerged from the scale across multiple studies. According to these descriptions, boredom proneness may appear to be a two-factor construct that constitutes one's reaction to external stimulation and the inability to generate internal stimulation. Nevertheless, Struk and colleagues (2017) demonstrated that the apparent two-factor solution is a product of the wording of the reverse-scored items instead of reflecting two actual latent constructs. After reversing these items and trimming the scale, they proposed an eight-item version with a single factor,

suggesting boredom proneness as a unitary construct. As such, Struk et al. (2017) questioned the previous supposition of boredom proneness as one's external and internal stimulations. They suggested that this construct "is characterized by an individual's capacity (or failure) to engage in sufficiently satisfying activities" (p. 356). However, the authors noted that to fully establish the validity of the scale, the characterization of boredom proneness has to be clarified. The question, what boredom proneness represents, remains unanswered.

3.1.2 Three Characterizations of Boredom Proneness

In the existing theoretical and empirical research, there are three particularly plausible characterizations of boredom proneness: boredom proneness is understood to represents individual differences in (a) the frequency of experiencing boredom, (b) the intensity of boredom when one experiences it, and (c) a global perception of how boring one's life is.

Characterization (a), that boredom proneness essentially represents individual differences in the frequency of feeling bored, seems consistent with various past treatments of boredom proneness. The BPS was designed to capture one's general tendency to experience boredom (Farmer & Sundberg, 1986). Presumably, tendency implies frequency; people who are more tending towards boredom should feel bored more often. Indeed, some of the items of the BPS refer to frequency, such as "*Much of the time* I just sit around doing nothing," and "I *often* find myself with nothing to do, time on my hands" (emphasis added). Consistent with this characterization, boredom proneness is indeed associated with the number of times participants reported being bored per day (Harris, 2000) and how often participants remembered being bored (Todman, 2013). Boredom proneness, as representing the frequency of experience, offers a characterization of boredom proneness that is broader than reflecting a personality trait, given that people may experience boredom less or more frequently from one context to another (e.g., *before* vs. *during* a lockdown due to a pandemic).

Characterization (b) is that boredom proneness represents the intensity with which boredom tends to be experienced. In the emotion literature, the intensity or magnitude of an emotional experience is sometimes treated as a stable construct that reflects individual differences (Diener et al., 1985; Larsen & Diener, 1987). It is possible that boredom-prone people experience a higher

intensity of boredom when feeling bored across different contexts. This postulation is supported by some empirical evidence: boredom proneness was correlated with intensity of state boredom measured by the Multidimensional State Boredom Scale (Fahlman et al., 2013). Further support comes from an experimental study (Mercer-Lynn et al., 2014), demonstrating that intensity of state boredom was independently predicted by both situational characteristics and boredom proneness. Findings from experience-sampling studies (Chan et al., 2018; Matic et al., 2015) also indicated that intensity of state boredom was associated with boredom proneness across situations; participants who scored higher in boredom proneness experienced boredom with greater intensity in their everyday lives.

Characterization (c) of boredom proneness proposes that it represents the broad appraisal that one's life is boring ("perceived life boredom"). People hold global perceptions over their lives, such as whether life is satisfying (Diener & Emmons, 1985), meaningful (Steger et al., 2006), or enables one to flourish (Diener et al., 2010). Perceived life boredom, we propose, may not reflect a personality trait but rather an evaluation of one's life in terms of whether or not it is boring. This evaluation may be shaped by societal or cultural standards of what a boring (or interesting) life looks like. Brissett and Snow (1993) characterized boredom from a similar global perspective: as an experienced absence of flow and momentum in one's life. Indeed, several questions in the BPS relate to the respondent's broad perceptions, such as "Many things I have to do are repetitive and monotonous," "I would like more challenging things to do in life," and "When I was young, I was often in monotonous and tiresome situations." In one of the studies by Farmer and Sundberg (1986), the authors, in fact, proposed that people who are high in boredom proneness would perceive situations as more boring. Related to this characterization, Bargdill (2000) examined life boredom in a phenomenological study with participants who considered themselves bored with their lives. He found that these participants became bored with their lives after they had compromised their life goals; they felt emotionally ambivalent and adopted a passive-avoidant stance towards their lives.

These three characterizations—frequency of boredom, intensity of boredom, and perceived life boredom—are not mutually exclusive. On the one hand, people who feel bored frequently and with higher intensity may come to see

their lives as more boring. On the other hand, perceived life boredom may influence how people evaluate their daily experiences of boredom; those who hold a perception that their lives are boring may be more readily notice signs of boredom in everyday life. However, these three constructs are distinct in the sense that frequency and intensity of boredom concern one's experience, while perceived life boredom is related to one's evaluation of life. We theorize that people can perceive their lives as boring (or not), based on comparison with other people or other periods of life, irrespective of their current, actual experience of boredom.

3.1.3 Current Research

Boredom proneness matters, as evident from its association with a wide range of relevant clinical, psychological, and social issues (e.g., Biolcati et al., 2016; Fahlman et al., 2009; Goldberg et al., 2011). This makes it particularly surprising that what boredom proneness is exactly remains somewhat elusive and inconclusive. In the current research, we took this question as a starting point and examined three potential characterizations of boredom proneness discussed above: individual differences in (a) the frequency of feeling bored, (b) the intensity of feeling bored, and (c) the perception that life as a whole is boring.

Across two studies, we tested the usefulness of these characterizations by examining how well they corresponded to boredom proneness (i.e., convergent validity), and if they produced a concurrent validity similar to boredom proneness. We reasoned that the most suitable characterization should covary strongly with boredom proneness scores. Accordingly, we compared their strengths of association with boredom proneness (convergent validity; *Criterion 1*). Furthermore, a good characterization should accurately reproduce the associations that boredom proneness has with relevant third variables (concurrent validity; *Criterion 2*). In Study 1, we tested this in the context of personality and life satisfaction; Study 2 focused on anxiety, depression, and stress. Taking a step further, we reasoned that a good characterization of boredom proneness should not only have good concurrent validity by reproducing the associations that boredom proneness has with third variables, but that it should be able to statistically account for (i.e., explain) this association. This is the equivalent to treating the characterization as *mediators* between boredom proneness and other

variables in which boredom proneness predicted well-being measures through frequency of boredom, intensity of boredom, and perceived life boredom. Accordingly, we expected to see indirect effects, which would imply that the three constructs characterize boredom proneness, and that they explain some of the effects of boredom proneness on well-being. Comparing the strength of these indirect paths would further inform us which of these characterizations may be most relevant to well-being (*Criterion 3*).

3.2 Study 1

The purpose of Study 1 was twofold. First, we examined the relationships between boredom proneness, frequency of boredom, intensity of boredom, and perceived life boredom (Criterion 1). Second, we examined if these three characterizations reproduce (Criterion 2), and statistically account for (Criterion 3), the relationships that boredom proneness had with personality and life satisfaction. Given the absence of a measure for perceived life boredom, an ancillary goal of Study 1 was to develop a scale that measures perceived life boredom.

3.2.1 Method

Participants

Data were collected in the United States (US) and Hong Kong (HK). The US sample consisted of 536 US residents recruited online through MTurk. As data quality control, we applied two inclusion criteria. We only permitted MTurk workers (a) residing in the US, (b) with approval rates above 90% to participate in the study (see Lac & Luk, 2019; Rancourt et al., 2019). We excluded participants who failed either attention check (n = 41), resulting in a final sample of 495 participants (46.5% female; age range = [18, 73], M = 35.8, SD = 11.5). A sensitivity analysis indicated that this sample size afforded a power of .80 for detecting effects sized ρ = .13, assuming a Type-I error rate of 5% (two-sided). The HK sample consisted of 285 adult residents recruited from The University of Hong Kong. After excluding participants who failed one or more of the two attention check items (n = 53) or were aged under 18 (n = 1), the final sample comprised 231 participants (64.1% female; age range = [18, 71], M = 27.6, SD = 12.5). The majority of these participants were from Hong Kong (97.0%), and

67.5% were students. A sensitivity analysis indicated that this sample allowed us to detect an effect of $\rho = .18$ in size with a power of .80 ($\alpha = .05$, two-sided).

Procedure and Measures

After giving informed consent and reporting demographic information, participants completed an online survey containing measures on boredom proneness, frequency of boredom, intensity of boredom, perceived life boredom, personality, and life satisfaction.

Boredom Proneness Scale. We used the original 28 items of the Boredom Proneness Scale (BPS; Farmer & Sundberg, 1986), with recommended the seven-point interval ratings (e.g., Goldberg et al., 2011; Malkovsky et al., 2012; Mercer-Lynn et al., 2013; 1 = *strongly disagree*; 7 = *strongly agree*). A higher total score indicates higher boredom proneness ($\alpha = .88$ in US Sample; $\alpha = .79$ in HK Sample).

Frequency and Intensity of Boredom. Two items were adapted from Bastian et al. (2012) to measure frequency ("How often have you felt bored in the last month?": 1 = *none of the time*; 9 = *all of the time*) and intensity ("When you feel bored, what is your experience of it like?": 1 = *very mild*; 9 = *very intense*) of boredom.

Perceived Life Boredom Scale. The Perceived Life Boredom Scale (PLBS) was developed for the purposes of this study to assess people's global perception of how boring their lives are. Seven items with high face validity were generated: "My life is boring," "My life is going nowhere," "There is always something less boring than what I am doing," "There is nothing fun in my life," "There is a mismatch between what I want to do and what I am doing now," "My life lacks novelty," and "Compared with others, my life is boring." Items were rated on a seven-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). We expected that people who perceive their life as boring will, to a higher degree, agree with these items. In other words, higher scores on the scale reflect a greater agreement that one's life is boring. The development and validation results are presented in Appendix A. The scale was unidimensional and has excellent internal consistency ($\alpha = .92$ in US Sample; $\alpha = .87$ in HK Sample); it also seems invariant across US and HK samples in assessing people's perception of how boring their lives are.

Big Five Inventory. We administered the 15-item version of the Big Five Inventory (Gerlitz & Schupp, 2005) to assess personality traits. Items were scored on a seven-point scale from 1 (*disagree strongly*) to 7 (*agree strongly*). Cronbach's alphas ranged from .53 to .73 in the US Sample and from .53 to .75 in the HK Sample, which were consistent with those found in past studies (e.g., Hahn et al., 2012; F. R. Lang et al., 2011; Specht et al., 2011) and suggested to be reasonable for a short instrument (F. R. Lang et al., 2011).

Satisfaction with Life Scale. The Satisfaction with Life Scale (Diener et al., 1985) comprises of five items (e.g., "In most ways my life is close to my ideal") designed to measure one's life satisfaction on a seven-point scale (1 = *strongly agree*; 7 = *strongly disagree*; $\alpha = .92$ in US Sample; $\alpha = .83$ in HK Sample).

Data Analysis

To evaluate Criterion 1—if and how strongly the three characterizations (frequency, intensity, life perception) were associated with boredom proneness—we examined both their zero-order correlations and their partial associations with boredom proneness. The correlations allowed us to examine how strongly each of the three characterizations overlapped with boredom proneness. Their partial associations, estimated with multiple regression analyses, allowed us to also determine if any of the three characterizations had overlap with boredom proneness above and beyond the other two. Furthermore, comparing their partial effect sizes would inform us if any of the three characterizations offered a particularly strong unique association with boredom proneness relative to the others.

To test Criterion 2—whether the three characterizations could reproduce the associations that boredom proneness have with other variables—we computed their zero-order correlation with personality and life satisfaction, and compared these to the same correlations for boredom proneness.

To test Criterion 3—whether and to what extend the three characterizations could account for the associations that boredom proneness had with personality and life satisfaction—we estimated indirect effects using a mediation analytic approach that reflects the extent the associations between boredom proneness and personality and life satisfaction could be explained by each of the three characterizations.

3.2.2 Results

Criterion 1: Relationships between Boredom Measures

Means, standard deviations, and correlations of the measured variables are presented in Table 3.1. Boredom frequency, intensity, and perceived life boredom all were significantly, and substantially, correlated with boredom proneness. This suggests that boredom frequency, intensity, and perceived life boredom each characterized boredom proneness to some degree.

Table 3.1

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

	M	*SD*	1	2	3	4
Study 1's US Sample (*N* = 495)						
1. Boredom proneness	106.05	23.75	-			
2. Frequency of boredom	5.27	2.22	.70***	-		
3. Intensity of boredom	5.12	2.28	.60***	.72***	-	
4. Perceived life boredom	3.95	1.61	.74***	.67***	.59***	-
5. Neuroticism	3.87	1.43	.53***	.46***	.39***	.52***
6. Extraversion	4.05	1.33	0	0	.07	-.07
7. Openness	5.40	1.14	-.17***	-.06	.03	-.04
8. Agreeableness	5.00	1.18	-.36***	-.25***	-.21***	-.27***
9. Conscientiousness	5.10	1.18	-.54***	-.45***	-.37***	-.45***
10. Life satisfaction	22.88	7.70	-.20***	-.08	.01	-.26***
Study 1's HK Sample (*N* = 231)						
1. Boredom proneness	102.57	15.78	-			
2. Frequency of boredom	4.25	2.01	.58***	-		
3. Intensity of boredom	4.01	1.97	.42***	.68***	-	
4. Perceived life boredom	3.33	1.16	.67***	.49***	.37***	-
5. Neuroticism	4.38	1.20	.38***	.36***	.33***	.42***
6. Extraversion	4.08	1.09	-.15*	-.11	-.02	-.16*
7. Openness	4.56	1.16	-.15*	.01	.03	-.13*
8. Agreeableness	4.95	0.97	-.28***	-.19**	-.08	-.24***
9. Conscientiousness	4.31	1.05	-.37***	-.33***	-.26***	-.32***
10. Life satisfaction	20.56	5.55	-.41***	-.34***	-.33***	-.56***
Study 2 (*N* = 608)						
1. Boredom proneness[a]	21.49	7.22	-			
2. Frequency of boredom	5.16	1.99	.45***	-		
3. Intensity of boredom	4.57	1.92	.42***	.59***	-	
4. Perceived life boredom	3.46	1.30	.64***	.50***	.37***	-
5. Depression	12.01	9.89	.63***	.40***	.34***	.66***
6. Anxiety	10.72	8.53	.46***	.26***	.28***	.43***
7. Stress	14.43	9.05	.49***	.29***	.33***	.49***

Note. [a]Measured by Short Boredom Proneness Scale.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Results from multiple regression analyses, where boredom proneness was regressed on all three characterizations, are displayed in Table 3.2. For the US Sample, all three measures were significantly associated with boredom proneness. Thus, each of the three characterized some unique part of boredom proneness. Among the three, perceived life boredom seemed to have the largest partial association with boredom proneness. To examine if its partial association was actually significantly greater than that of the second-highest (frequency of boredom), we fitted the same model constraining the association for frequency and perceived life boredom to be equal. This resulted in a significantly worse model fit, ΔCFI = .030, ΔRMSEA = .170, $\Delta\chi^2 = 15.4$, $p < .001$. Constraining the association for intensity and perceived life boredom to be equal also resulted in a significantly worsened model fit, ΔCFI = .111, ΔRMSEA = .329, $\Delta\chi^2 = 54.5$, $p < .001$. These results indicate that the association with perceived life boredom was indeed significantly greater than that of frequency and intensity of boredom. For the HK Sample, only frequency and perceived life boredom were significantly associated with boredom proneness; there was no significant association between intensity of boredom and boredom proneness. Constraining the associations for frequency and perceived life boredom to be equal resulted in a significantly worsened model fit, ΔCFI = .10, ΔRMSEA = .273, $\Delta\chi^2 = 18.2$, $p < .001$. Constraining the associations for intensity and perceived life boredom to be equal also resulted in a significantly worsened model fit, ΔCFI = .297, ΔRMSEA = .470, $\Delta\chi^2 = 52.0$, $p < .001$. These indicate that the association of perceived life boredom and boredom proneness was significantly greater than that of boredom frequency and that of intensity.

With regard to Criterion 1, the above results reveal the following. Firstly, boredom frequency, intensity, and perceived life boredom each characterize boredom proneness to some degree. Secondly, perceived life boredom and boredom frequency each characterized a part of boredom proneness that was unique from the other two; boredom intensity did so less consistently, with its partial association reaching significance only in the US Sample. Thirdly, of the three, it seems that perceived life boredom was especially representative of boredom proneness, accounting for a particularly substantial part of its variance above and beyond the other two.

Table 3.2

Regression Models with Boredom Proneness as Outcome Variable in Studies 1 and 2

	Study 1's US Sample (N = 495)			Study 1's HK Sample (N = 231)			Study 2 (N = 608)		
Predictor	B	SE	β	B	SE	β	B	SE	β
Intercept	106.057	0.658		102.571	0.716		21.487	0.219	
Frequency of boredom	3.404	0.477	0.317***	2.503	0.518	0.319***	0.319	0.147	0.088*
Intensity of boredom	1.019	0.426	0.098*	0.123	0.497	0.015	0.625	0.142	0.167***
Perceived life boredom	6.894	0.567	0.465***	6.905	0.715	0.506***	2.960	0.196	0.533***
R^2	0.624			0.531			0.449		

Note. All predictors were centered. Boredom proneness was measured by Short Boredom Proneness Scale in Study 2.
* $p < .05$, *** $p < .001$.

Criterion 2: Reproducing Correlations with Personality and Life Satisfaction

The three characterizations reproduced most of the associations that boredom proneness had with personality and life satisfaction (Table 3.1). In the US Sample, all three showed similar correlations with boredom proneness on neuroticism, extraversion, agreeableness, and conscientiousness, but not openness to experience. Specifically, only perceived life boredom reproduced the correlation that boredom proneness had with life satisfaction. In the HK Sample, perceived life boredom reproduced the correlations of boredom proneness with all five personality traits and life satisfaction. Frequency and intensity of boredom showed similar correlations with boredom proneness on neuroticism, conscientiousness, and life satisfaction, but not with extraversion, openness, and agreeableness. Overall, these results indicate that frequency of boredom, intensity of boredom, and perceived life boredom each reproduced at least some of the associations that boredom proneness had with personality and life satisfaction in the US Sample and to a lesser degree in the HK Sample. Across both samples, perceived life boredom reproduced more of the associations that boredom proneness had with personality and life satisfaction than frequency and intensity of boredom, suggesting that perceived life boredom may be a particularly useful characterization of boredom proneness.

Criterion 3: Accounting for Correlations with Personality and Life Satisfaction

The above results indicate whether boredom frequency, boredom intensity, and perceived life boredom correlated with personality and life satisfaction similarly as did boredom proneness. We next examined whether the three characterizations could *account* for the correlations that boredom proneness had with personality and well-being. To this end we examined if the associations that boredom proneness had with personality (results presented in Appendix A) and life satisfaction changed after introducing the three characterizations and further qualified how much each characterization was responsible for this change. This latter issue—the magnitude and significance of the change in the association of boredom proneness that can be attributed to boredom frequency, boredom intensity, and perceived life boredom—is mathematically equivalent to indirect effects of boredom proneness on personality and life satisfaction through each of the characterizations. We therefore estimated these using indirect effect analyses where the characterizations operated as *mediators*. We emphasize that this use of

indirect effect analysis is to produce the estimates of change in associations of interest and should not be interpreted as an attempt to postulate or test a causal order.

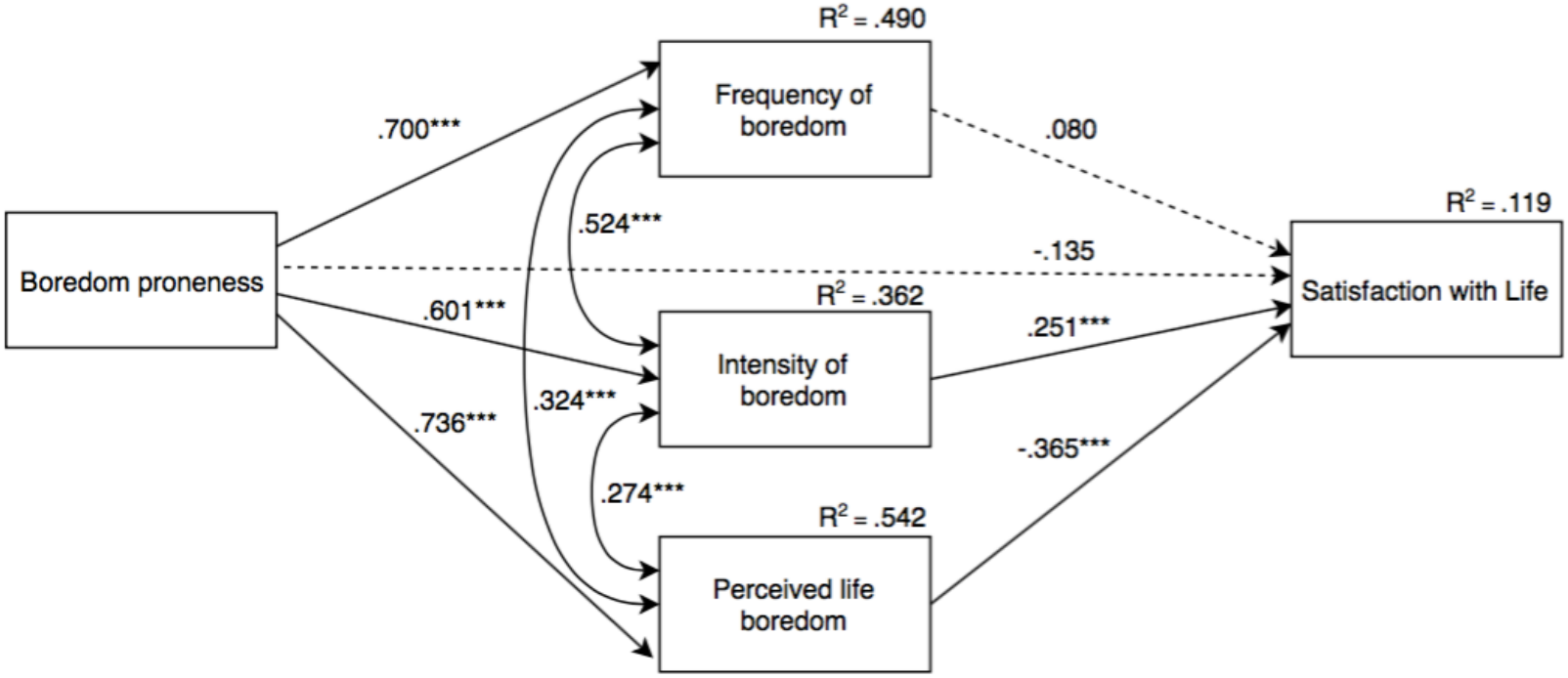
US Sample. An indirect effect analysis with 1,000 bootstrap samples was conducted on the US Sample to test the path model. Full information maximum likelihood estimation (FIML) was applied to handle a small amount of missing data (< 0.1%). Standardized path coefficients are displayed in Figure 3.1. Boredom proneness was positively associated with perceived life boredom, frequency, and intensity of boredom. Life satisfaction was associated with perceived life boredom and intensity of boredom, but not with boredom proneness and frequency of boredom.

The indirect effects that boredom proneness had with life satisfaction, through perceived life boredom (β = -.27, 95% *CI* [-.121, -.049]) and intensity of boredom (β = .15, 95% *CI* [.025, .076]), were significant. The same was not true for frequency of boredom (β = .056, 95% *CI* [-.020, .055]). These results suggest that the total association that boredom proneness had with life satisfaction is to a significant degree attributable to perceived life boredom and boredom intensity.

Furthermore, constraining the paths of indirect effects through perceived life boredom (the largest indirect effect) and intensity of boredom (the second largest indirect effect) to be equal significantly worsened the model fit, ΔCFI = .032, ΔRMSEA = .279, $\Delta\chi^2 = 39.4$, $p < .001$. Constraining the paths of indirect effects through perceived life boredom and frequency of boredom to be equal likewise resulted in significantly worsened model fit, ΔCFI = .013, ΔRMSEA = .182, $\Delta\chi^2 = 17.3$, $p < .001$. These indicate that the indirect effect through perceived life boredom was greater than those through intensity of boredom and frequency of boredom. Put otherwise, perceived life boredom was particularly effective in accounting for the association that boredom proneness held with life satisfaction. To a lesser degree this was also the case for boredom intensity.

Figure 3.1

Path Model of the Effects of Boredom Proneness, Frequency and Intensity of Boredom, and Perceived Life Boredom on Life Satisfaction in Study 1's US Sample



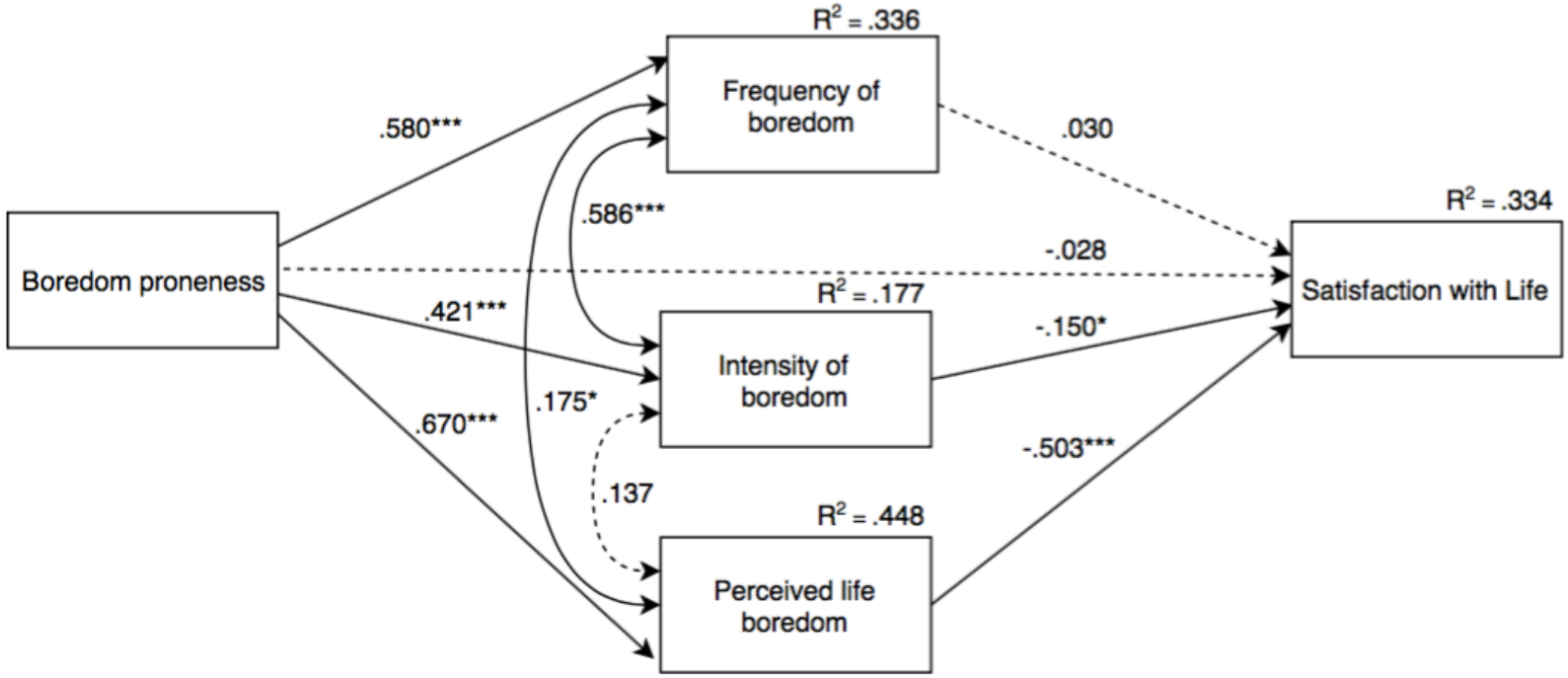
Note. Path coefficients are standardized estimates. Solid paths indicate significant effects, dashed lines are not significant.
*** $p < .001$.

HK Sample. We tested the same model using indirect effect analysis with 1,000 bootstrap samples with the HK Sample. Standardized path coefficients are presented in Figure 3.2. Boredom proneness was positively associated with perceived life boredom, frequency, and intensity of boredom. Whereas perceived life boredom and intensity of boredom were inversely associated with life satisfaction, no direct effect of boredom proneness or frequency of boredom on life satisfaction was found.

The indirect effects between boredom proneness and life satisfaction, through perceived life boredom (β = -.34, 95% *CI* [-.158, -.080]) and intensity of boredom (β = -.063, 95% *CI* [-.042, -.001]), were significant. The same was not true for frequency of boredom (β = .018, 95% *CI* [-.027, .042]). Constraining the paths of indirect effects through perceived life boredom and intensity of boredom to be equal significantly worsened in model fit, ΔCFI = .037, ΔRMSEA = .273, $\Delta\chi^2 = 18.2$, $p < .001$. Likewise, constraining the paths of indirect effects through perceived life boredom and frequency of boredom to be equal resulted in significantly worsened model fit, ΔCFI = .045, ΔRMSEA = .300, $\Delta\chi^2 = 21.8$, $p < .001$. These results suggest that the indirect effect through perceived life boredom was greater than those through intensity of boredom and frequency of boredom. Put differently, much like in the US sample, in the HK sample, perceived life boredom accounted for more of the association that boredom proneness held with life satisfaction than did the other two characterizations.

Figure 3.2

Path Model of the Effects of Boredom Proneness, Frequency and Intensity of Boredom, and Perceived Life Boredom on Life Satisfaction in Study 1's HK Sample



Note. Path coefficients are standardized estimates. Solid paths indicate significant effects, dashed lines are not significant.
* $p < .05$, *** $p < .001$.

3.2.3 Discussion

Across two samples, boredom proneness was moderately to strongly associated with frequency of boredom, intensity of boredom, and perceived life boredom. The three characterizations also reproduced most of the associations that boredom proneness held with Big Five personality traits. The indirect effects of boredom proneness with life satisfaction through perceived life boredom and intensity of boredom, coupled with the resulting non-significant direct effect of boredom proneness on life satisfaction, illustrate that perceived life boredom and intensity of boredom explained some of the variances of life satisfaction that was associated with boredom proneness. In other words, part of the relationship between boredom proneness and life satisfaction could be characterized by perceived life boredom and boredom intensity. Comparing the three characterizations, perceived life boredom seems to be the better-suited characterization of boredom proneness, as evident from its consistently largest effect sizes in partial association with boredom proneness (Criterion 1), the findings that it reproduced most of the associations that boredom proneness had with personality and life satisfaction (Criterion 2), and its indirect effect being the largest among the three characterizations in path analysis (Criterion 3).[5] This indicates that boredom proneness might be helpfully characterized as people's global perception of how boring their lives are, with boredom frequency or intensity playing smaller roles.

3.3 Study 2

Study 1 suggests that frequency of boredom, intensity of boredom, and perceived life boredom each characterize boredom proneness to some degree. Among them, perceived life boredom seems to characterize boredom proneness particularly well. We conducted Study 2 to examine whether these results also emerged when using the more recent, psychometrically superior, Short Boredom Proneness Scale (SBPS; Struk et al., 2017). The SBPS is a version of the original

[5] Considering that PLBS is a seven-item scale, whereas frequency and intensity of boredom were measured with single items, we took an item from PLBS with the highest face validity (i.e., "My life is boring") to represent perceived life boredom and tested the same path model. The results stayed largely the same and they are presented in Appendix A.

boredom proneness scale that seems to offer a comparatively improved measure of boredom proneness (Struk et al., 2017). Despite its limitations (Gana et al., 2019), it remains the best measure available at the time of the study and it has been gaining ground as a popular measure of boredom proneness (e.g., Al-Saggaf et al., 2019; Kılıç et al., 2020). In addition, we included in this study well-being measures beyond life satisfaction—depression, anxiety, and stress—as past research has suggested significant associations between these constructs and boredom proneness (e.g., Elhai et al., 2018; Fahlman et al., 2009; Lee & Zelman, 2019).

3.3.1 Method

Participants

Participants were 684 residents of Hong Kong recruited from The University of Hong Kong.[6] We excluded one duplicate response (n = 1), participants who did not provide responses other than demographic information (n = 21), two participants under 18 who did not provide parental consent (n = 2), and those who failed an attention check item (n = 52). The final sample contained 608 participants (70.9% female; age range = [17, 62], M = 22.8, SD = 6.21). A sensitivity analysis indicated that this sample size allowed us to detect effects sized ρ = .11 with .80 power (α = 0.05 alpha; two-sided).

Procedure and Measures

After giving informed consent and reporting demographics, participants completed an online survey. This survey contained the eight-item SBPS (Struk et al., 2017; 1 = *strongly agree*; 7 = *strongly disagree*; α = .88). As in Study 1, the survey also featured measures for frequency and intensity of boredom, and the perceived life boredom scale (α = .90). Participants then completed the Depression, Anxiety, and Stress Scale (DASS-21; Lovibond & Lovibond, 1995). This is a 21-item scale that consists of three subscales measuring symptoms of depression (α = .90), anxiety (α = .83) and stress (α = .85). Responses were

[6] This sample was formed by combining two samples from two correlational studies. Both samples were collected from The University of Hong Kong. A comparison of the two samples and their individual results are presented in Appendix A.

recorded on a four-point scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much or most of the time*).

Data Analysis

We performed the same set of analyses to evaluate Criteria 1, 2, and 3 as in Study 1. Where these analyses were performed on the Big Five personality factors and life satisfaction in Study 1, in Study 2 we examined depression, anxiety and stress instead.

3.3.2 Results

Criterion 1: Relationships between Boredom Measures

Table 3.1 displays the means, standard deviations, and correlations of the measured variables. Boredom frequency, intensity, and perceived life boredom were all significantly and substantially correlated with boredom proneness. As in Study 1, boredom frequency, intensity, and perceived life boredom each characterized boredom proneness. Furthermore, regressing boredom proneness simultaneously on all three characterizations indicated that each shared unique variance with boredom proneness above and beyond the others (Table 3.2). Constraining the paths of perceived life boredom and intensity of boredom to be equal resulted in significantly worsened model fit, ΔCFI = .220, ΔRMSEA = .361, $\Delta\chi^2 = 79.2$, $p < .001$. Constraining the associations for perceived life boredom and frequency of boredom to be equal also resulted in a significantly worse model fit, ΔCFI = .223, ΔRMSEA = .363, $\Delta\chi^2 = 80.4$, $p < .001$. These indicate that the association between perceived life boredom and boredom proneness was significantly greater than that of boredom intensity and boredom proneness, and that of boredom frequency and boredom proneness. These findings indicate that boredom frequency, intensity, and perceived life boredom each characterize boredom proneness to some degree. Of the three, perceived life boredom was especially characteristic of boredom proneness, accounting for a particularly substantial part of its variance above and beyond the other two.

Criterion 2: Reproducing Correlations with Depression, Anxiety, and Stress

All three characterizations reproduced the correlations that boredom proneness had with depression, anxiety, and stress (Table 3.1).

Criterion 3: Accounting for Correlations with Depression, Anxiety, and Stress

As in Study 1, we next examined if boredom frequency, boredom intensity, and perceived life boredom could account for the associations that boredom proneness had with depression, anxiety, and stress. We did so again with a path model where the three characterizations were included as mediators (1,000 bootstrap samples). We used FIML to handle the small amount of missing data at item level (0.8%). Standardized path coefficients are presented in Figure 3.3. Boredom proneness was positively associated with perceived life boredom, frequency, and intensity of boredom. Depression had a significant association with boredom proneness and perceived life boredom. Anxiety and stress were significantly associated with boredom proneness, perceived life boredom, and intensity of boredom.

There were indirect effects of boredom proneness, through perceived life boredom, on symptoms of depression (β = .27, 95% *CI* [.283, .454]), anxiety (β = .14, 95% *CI* [.091, .242]), and stress (β = .18, 95% *CI* [.146, .311]). There were also indirect effects of boredom proneness, through intensity of boredom, on anxiety (β = .044, 95% *CI* [.010, .100]) and stress (β = .060, 95% *CI* [.025, .126]), but not on depression (β = .015, 95% *CI* [-.023, .063]). The indirect effects of boredom proneness, through frequency of boredom on symptoms of depression (β = .008, 95% *CI* [-.033, .062]), anxiety (β = -.022, 95% *CI* [-.077, .023]), and stress (β = -.025, 95% *CI* [-.085, .029]) were not significant. These results so far indicate that part of the total association between boredom proneness with depression, anxiety, and stress is characterized by perceived life boredom. The same was true for boredom intensity in relation to anxiety and stress.

Constraining the paths of indirect effects through perceived life boredom and intensity of boredom on depression to be equal significantly worsened model fit (ΔCFI = .030, ΔRMSEA = .331, $\Delta\chi^2 = 67.7$, $p < .001$). This also applies to the indirect effects on anxiety (ΔCFI = .003, ΔRMSEA = .099, $\Delta\chi^2 = 6.95$, $p = .008$) and stress (ΔCFI = .005, ΔRMSEA = .131, $\Delta\chi^2 = 11.5$, $p = .001$). Constraining the paths of indirect effects through perceived life boredom and frequency of boredom on depression to be equal likewise resulted in significantly worsened model fit (ΔCFI = .024, ΔRMSEA = .296, $\Delta\chi^2 = 54.3$, $p < .001$), which again was also the case for the indirect effects on anxiety (ΔCFI = .006, ΔRMSEA = .151, $\Delta\chi^2 = 14.9$, $p < .001$) and stress (ΔCFI = .011, ΔRMSEA = .201, $\Delta\chi^2 = 25.6$, $p <$

.001). These results indicate that, of the three, perceived life boredom most prominently characterized boredom proneness in its associations with depression, anxiety, and stress.

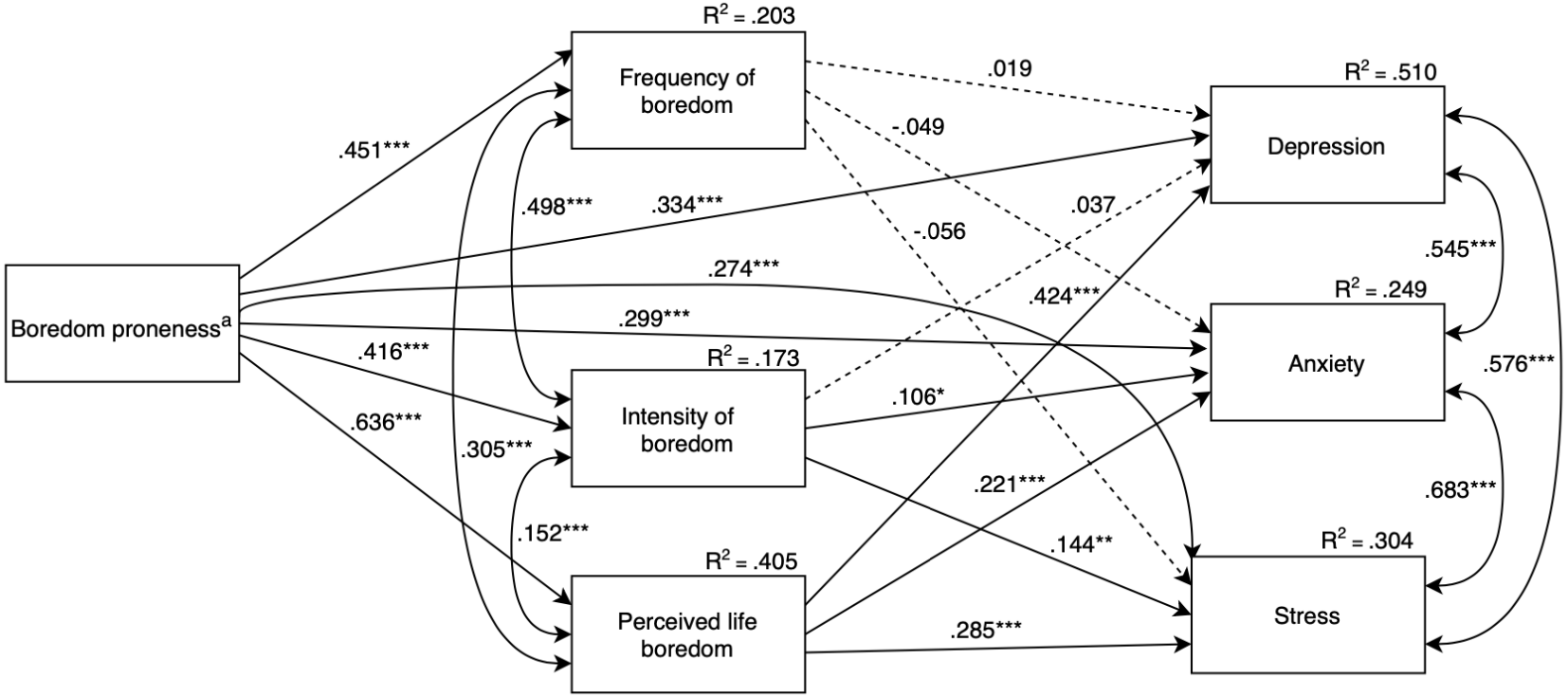
3.3.3 Discussion

Taken together, as in Study 1, all three characterizations represent some aspects of boredom proneness. Among them, perceived life boredom seems to most closely characterize boredom proneness, as it had the largest effect size in association with boredom proneness (Criterion 1), and it was the only characterization that reproduced all the associations boredom proneness had with depression, anxiety, and stress (Criterion 2). The indirect effects of boredom proneness on symptoms of depression, anxiety, and stress through perceived life boredom were stronger for perceived life boredom than for those through frequency and intensity of boredom. This final observation suggests that the associations that boredom proneness has with symptoms of depression, anxiety, and stress are especially well characterized by perceived life boredom (Criterion 3).[7]

[7] The result was similar when we performed the same path model with only one item representing perceived life boredom (see Appendix A).

Figure 3.3

Path Model of the Effects of Boredom Proneness, Frequency and Intensity of Boredom, and Perceived Life Boredom on Depression, Anxiety and Stress in Study 2



Note. Path coefficients are standardized estimates. Solid paths indicate significant effects, dashed lines are not significant.
[a]Measured by Short Boredom Proneness Scale.
* $p < .05$, ** $p < .01$, *** $p < .001$.

3.4 General Discussion

We examined what characterizes the construct of boredom proneness as measured by BPS. We did this through testing and comparing three plausible characterizations derived from prior research: frequency of boredom, intensity of boredom, and perceived life boredom. While the results provided support to all three characterizations, we found that perceived life boredom seems to take precedence in relating to boredom proneness. It was consistently associated with boredom proneness across all three samples with the largest effect sizes in regression models (Criterion 1), and it reproduced most of the associations that boredom proneness had with personality and life satisfaction in Study 1, as well as with symptoms of depression, anxiety, and stress in Study 2 (Criterion 2). Furthermore, perceived life boredom accounted for the largest part of the associations that boredom proneness had with life satisfaction, symptoms of depression, anxiety, and stress (Criterion 3). These findings converge to suggest that it may be useful to characterize boredom proneness as primarily reflecting people's global perception of how boring life is, with boredom frequency and intensity taking complementary but ultimately secondary roles.

Our results aligned with past research. Consistent with Harris (2000) and Todman (2013), we found that participants who scored higher in boredom proneness reported a higher frequency of experiencing boredom. Consistent with Fahlman et al. (2013), Mercer-Lynn et al. (2014), and Chan et al. (2018), we found that participants who scored higher in boredom proneness experienced greater intensity of boredom when feeling bored. In addition, participants who were higher in boredom proneness perceived their lives as more boring. Overall, our findings suggest that boredom proneness might be characterized in terms of individual differences in frequency of boredom, intensity of boredom, and especially perceived life boredom. This helps elucidate the relationships between boredom proneness and other well-being measures. Past research suggested that boredom proneness is associated with lower life satisfaction (Farmer & Sundberg, 1986), more depressive symptoms (e.g., Elhai et al., 2018; Goldberg et al., 2011; Malkovsky et al., 2012), greater anxiety (Fahlman et al., 2009; Mercer-Lynn, Flora, et al., 2013; Wolniewicz et al., 2020) and stress (Lee & Zelman, 2019). Our findings are aligned with that earlier work.

Furthermore, our results provide a few novel insights into these relationships. First, some effects of boredom proneness on well-being might be attributable to the global perception of how boring one's life is. Among the three characterizations, perceived life boredom seems to play a more prominent role in explaining boredom proneness covariance in life satisfaction, as well as symptoms of depression, anxiety, and stress. Perceiving life as boring might bring greater negative effects on well-being than the actual experience of boredom. It is consistent with the proposition that people's beliefs about what they have experienced in general may be more consequential than the emotions themselves (Robinson & Clore, 2002) as the former tend to remain stable despite fluctuations in moment-to-moment emotions. Another possible explanation for this is that perceived life boredom might be akin to perceived life meaning. A wealth of research has demonstrated the influence of perceived life meaning on depression (e.g., Blackburn & Owens, 2015; Mascaro & Rosen, 2008; Schnetzer et al., 2013; Steger et al., 2006) and life satisfaction (e.g., Pan et al., 2008; Steger et al., 2006, 2011; Steger & Kashdan, 2007; Zika & Chamberlain, 1992). Given the intertwined relationship between boredom and meaning (e.g., Chan et al., 2018; Fahlman et al., 2009; Van Tilburg & Igou, 2011, 2013), it is possible that perceiving life as boring to some extent reflects perceiving life as meaningless, and hence affects well-being. Future studies may seek to examine what contributes to perceived life boredom, how to change it, and whether modifying it would help ameliorate the effect of boredom proneness on mental health.

Second, evident from both direct and indirect effects in mediation analyses, intensity of boredom was associated with life satisfaction. Curiously, at the bivariate level, neither intensity nor frequency of boredom was associated with life satisfaction among the US sample. Our current findings cannot ascertain whether this discrepancy was due to the difference in sample sizes, and thus power, or it suggested a cultural difference; future research is needed to elucidate the relationship.

Third, the three characterizations of boredom were correlated with each other (Table 3.1; in the range of $r = .59$ to $r = .72$; ps $< .001$), with corresponding shared variances of 35% to 52%. Thus, while far from being interchangeable, there is clearly interrelatedness between them. While prior empirical tests of their interrelatedness—to our knowledge—do not exist, this interrelatedness seems

theoretically reasonable. For example, research on boredom rates by Chin and colleagues (2017) found that boredom occurred comparatively *frequently* in education (specifically, when studying) and when people were alone. Similarly, Van Tilburg and Igou (2011) found that particularly *intense* boredom situations often featured an educational context and being alone. Perhaps, when people tend to experience boredom more intensely then boredom tends also to more frequently be felt as a distinct state among the various affective states that occur over the course of time. Plausibly, being bored frequently and intensely will, over time, contribute to a perception that one's life in general is boring, and upholding the belief that life is boring may tempt one to judge situations as boring. So, while frequency of boredom, intensity of boredom, and perceived life boredom are sufficiently distinct to be treated as separate entities, they nonetheless share theoretically reasonable, and empirically verifiable, elements. Further investigations are needed to understand their relationships, and what psychosocial characteristics and personality traits contribute to the individual differences in the three characterizations, respectively.

It is important to note that there have been recurring critiques over the psychometric properties of the BPS. The scale has been suggested to have two to five factors in various studies (e.g., Craparo et al., 2013; Sung et al., 2021; Vodanovich et al., 2005; Vodanovich & Kass, 1990; see Struk et al., 2017 for a summary). Gana and colleagues (2019) administered the full BPS, BPS-Short Form (Vodanovich et al., 2005) as well as SBPS to a sample of elderly persons four times over six years and applied a trait-state-occasion model to test the validity of the scales. Intriguingly, they found that measurement error variance accounted for two-thirds of the variance of the scales. Given the large amount of error variance, the authors cast doubts on the psychometric properties of all three scales in capturing trait boredom. Caution should therefore be exercised in interpretations of our findings. Although they help clarify the characterizations of boredom proneness, they do not address the psychometric limitations of the scale.

It is also important to note that the interpretation of our results, much like existing research on boredom proneness, is dependent on the assumption that the BPS serves as an adequate measure of the construct boredom proneness. In fact, how observed scores of measurements reflect theoretical, unobservable attributes is an age-old question in psychology (e.g., Borsboom, 2006; Borsboom et al.,

2004; Christensen et al., 2020), exemplified by ongoing debates concerning the measurement of psychological constructs with great potential implications such as intelligence (Flynn, 1987) and implicit cognition (Blanton et al., 2006). The current study suggests that frequency of boredom, intensity of boredom, and perceived life boredom characterize boredom proneness as measured by BPS; however, it did not examine the *test validity* (Borsboom et al., 2004) of BPS, i.e., whether the construct of boredom proneness exists and whether the construct causally produces variations in the scores of BPS. These problems have to be addressed by substantive theory (Borsboom, 2006; Borsboom et al., 2004) delineating the causal processes underlying the variations in the construct of boredom proneness and the variations in BPS's scores. Such theory is, so far, absent in the literature.

3.4.1 Implications, Limitations, and Future Directions

Much effort has been put into addressing the measurement problems of BPS in the past (e.g., Struk et al., 2017; Vodanovich et al., 2005). To the best of our knowledge, the current research is, however, the first empirical attempt in systematically addressing the conceptual ambiguity of boredom proneness. Our findings help provide clarity on the construct and novel insights into understanding its relationships with well-being. The Perceived Life Boredom Scale we developed would also serve as a useful tool in elucidating the previously identified associations boredom proneness had with a wide range of problematic behaviours and clinical issues.

Our results, however, have to be considered within the context of several limitations in the present studies. First, frequency and intensity of boredom were assessed with retrospective reporting measures. Future studies could adopt an experience-sampling approach to obtain a more accurate report of people's actual boredom experience. Second, it is not certain whether frequency, intensity, and perceived life boredom are outcomes of boredom proneness, or components of it. We hypothesized the latter based on past interpretations of boredom proneness (e.g., Elpidorou, 2014; Fahlman et al., 2013; Vodanovich & Watt, 2016), yet further theoretical discussion and empirical research are needed to clarify this. Third, the current research was a preliminary investigation into the characterizations of boredom proneness, and, as such, was limited by our

hypothesized characterizations. By no means do we suggest frequency of boredom, intensity of boredom, and perceived life boredom make up the totality of boredom proneness, or do we attempt to give a definitive account of what boredom proneness is. There might of course be other possible ways of characterizing boredom proneness. The three we examined seemed, based on the boredom literature to be particularly plausible, a prediction that indeed turned out correct. Yet, this does not rule out that other characterizations might complement the present ones. For example, previous studies have suggested a close linkage between boredom proneness and failure in self-regulation (Elpidorou, 2018a; Mugon et al., 2018; Struk et al., 2016). Researchers have also speculated whether boredom proneness might in part reflect one's (poor) ability in coping with boredom (Mercer-Lynn et al., 2014). In the previous chapter, we postulated from the Boredom Feedback Model that chronic boredom might be brought by a dysfunction of the regulatory feedback loop. Clearly, there exist avenues for further research into the character of boredom proneness.

3.5 Conclusion

Boredom proneness is unambiguously linked with various psychological issues and mental health outcomes, yet, as a construct, it is elusive at best. The results from two studies suggest that it can be characterized as boredom frequency, boredom intensity, and, especially, perceived life boredom. Our findings shed new light on boredom proneness and its relationship with well-being. With a foundation of what state (Chapter 2) and chronic (Chapter 3) boredom are, we turn to investigate how people evaluate this emotion in the following chapter.

Chapter 4

Identifying People's Lay Beliefs about Boredom

4.1 Introduction

Boredom has traditionally been scrutinized by philosophers, sociologists, and psychologists through negative lens, described as a "malady," (Fahlman et al., 2009, p. 307) "the root of all evil," (Kierkegaard, 1843/1987, p. 286, as cited in Elpidorou, 2014) and a personal hell (Fromm, 1963/2004, p. 150, as cited in Van Tilburg, Igou, et al., 2019). It was not until recently that researchers attempted to reconstruct the narratives about boredom by shedding light on its adaptive functions (Bench & Lench, 2013; Elpidorou, 2014). Although the feeling of boredom is itself unpleasant (e.g., Eastwood et al., 2012; Smith & Ellsworth, 1985; Van Tilburg & Igou, 2017a), it is not inherently "bad" (Danckert, Mugon, et al., 2018; Elpidorou, 2014). As reviewed in Chapter 2, theorists treat it as a signpost in directing people towards meaningful pursuits (Eastwood & Gorelik, 2019; Van Tilburg & Igou, 2012). Regardless of its unpleasant experience, people may hold different lay perceptions of boredom's value; boredom may be considered good or bad, useful or useless. These lay perceptions plausibly matter; research has pointed to the importance of emotion beliefs on emotional experience, behaviours and well-being (e.g., Ford, Lam, et al., 2018; Yoon et al., 2018); for example, the undesirable effect of negative affect on well-being is less salient among people who see value in these negative feelings (Luong et al., 2016). How do people evaluate and understand boredom? This chapter investigates this question.

4.1.1 The Importance of Understanding Boredom

As reviewed in previous chapters, boredom is a prevalent emotion (Chin et al., 2017). While brief periods of state boredom can lead to desirable (e.g., creativity, prosocial tendencies; Mann & Cadman, 2014; Van Tilburg & Igou, 2017b) and undesirable behavioural responses (e.g., unhealthy snacking, risk-taking; Havermans et al., 2015; Kılıç et al., 2020; Moynihan et al., 2015), chronic boredom is associated with a range of mental health issues (e.g., depressive symptoms, anhedonia, dysphoria; Fahlman et al., 2009; Goldberg et al., 2011; Lee & Zelman, 2019; Mercer-Lynn, Flora, et al., 2013) and maladaptive behaviours

(e.g., emotional eating, compulsive smartphone use; Crockett et al., 2015; Elhai et al., 2018). From the perspectives of emotion regulation and coping, whether boredom is helpful or harmful depends on how people act upon it. Some emerging evidence, presented in Chapter 3, suggests it is the generalized maladaptive inferences we draw from chronic boredom (e.g., "that my life is boring") instead of the experience itself that might be associated with psychological distress. How we regulate an emotion is influenced by our beliefs about it (Ford & Gross, 2018, 2019). Examining lay beliefs about boredom therefore has theoretical and practical implications.

4.1.2 Emotion Beliefs

In the past decade, researchers have become increasingly interested in how people evaluate emotions, in the form of attitudes towards emotion (Harmon-Jones et al., 2011), ideal affect (Tsai, 2017), beliefs about emotion (Ford & Gross, 2018), or affect valuation (Luong et al., 2016). People can evaluate emotions on different dimensions, such as desirability, utility, controllability, appropriateness, and values (Ford & Gross, 2018; Luong et al., 2016). Netzer and colleagues (2018) proposed that attitudes towards emotion are not homogeneous constructs but consisted of three distinct components: affective (how much people like or dislike an emotional experience), behavioural (how people act in response to emotion), and cognitive components (how positively or negatively people think about an emotion).

These evaluations influence people's choices of situations and the way they approach them. Generally, people prefer to experience pleasant and familiar emotions more than unpleasant or unfamiliar ones (Ford & Tamir, 2014); those who evaluate an emotion less (vs. more) favourably tend to avoid (vs. approach) respective emotion-inducing stimuli (Harmon-Jones et al., 2011; Markovitch et al., 2017). These beliefs also shape emotional experience. Studies show that emotions that involve behavioural approach, such as joy and anger, are experienced more intensely when evoked; the opposite was found for emotions characterized by behavioural withdrawal, such as fear and disgust (Harmon-Jones et al., 2011). Likewise, participants who value low arousal positive states such as calmness find calming (vs. exciting) activities more enjoyable (Chim et al., 2018).

Further, beliefs about emotions influence subsequent emotion regulation (Ford & Gross, 2018, 2019). Tamir and colleagues (2015), for example, found that people who expect an emotion to be useful are more motivated to seek out that emotion through up-regulation. In line with this, Karnaze and Levine (2018) found that participants who believed that emotions are helpful more likely adopted reappraisal strategies, whereas those who believed emotion are hinderances were more likely to suppress emotions.

Apart from their influence on emotion regulation, there is emerging evidence that emotion beliefs also influence the emotion-health link. For example, the valuation of negative affect (i.e., seeing negative affect as pleasant, useful, appropriate, and meaningful) was found to weaken the associations between negative affect and various indicators of psychological and physical health (Luong et al., 2016). Positive associations were instead found between negative attitudes towards emotion and depression (Yoon et al., 2018). Taken together, emotion beliefs have strong implications on emotional experience, behaviours, as well as physical and psychological well-being.

4.1.3 Beliefs about Boredom

Given the prevalence and potentially dire consequences of boredom on the one hand, and the importance of emotion beliefs on the other, it is important to examine the effects of lay beliefs about boredom. In what follows, we draw on psychological, sociological, and philosophical discussions of boredom, in an attempt to postulate the scope of lay beliefs that people have about boredom.

The connotations of boredom have been predominantly negative. It has been described as "the 'occupational disease' of being human" (May, 1953, p. 260) and "an intractable and complex malady" (Fahlman et al., 2009, p. 307). Erich Fromm (1963/2004) wrote "If I were to imagine Hell, it would be the place where you were continually bored" (p. 150). From a sociology perspective, Brissett and Snow (1993) described boredom as "an experience of 'dead ending,' of being someplace with nowhere to go, of being disengaged from the ebb and flow of human interaction" (pp. 240-241). Boredom was commented to be a socially disvalued emotion (Darden, 1999), and describing something as boring is essentially attributing certain negative characteristics to it (Conrad, 1997). Social constructivist approaches (e.g., Ohlmeier et al., 2020) emphasize the role of

historical, cultural, and social influences that shaped lay beliefs about this emotion. For example, during the industrial revolution, boredom may have become particularly prominent among marginalized groups, such as the poor, homeless, and middle-class women, which may have accordingly shaped society's current negative perception of this emotion. Consistently, recent findings indicate that people see stereotypically boring others as incompetent, interpersonally cold, and to be socially avoided (Van Tilburg et al., 2022).

A number of positive qualities of boredom have been unearthed in recent years (see a review by Elpidorou, 2014). Researchers found that boredom may spark creativity (Mann & Cadman, 2014), can inspire (J. A. Hunter et al., 2016), might elevate prosocial tendencies (Van Tilburg & Igou, 2017b), and provoke self-reflection (Lomas, 2017). It serves a regulatory function by informing people that they are not optimally engaged (Danckert, Mugon, et al., 2018; Eastwood & Gorelik, 2019), and motivates them to search for more meaningful (Van Tilburg et al., 2013; Van Tilburg & Igou, 2017b) and novel experiences (Bench & Lench, 2019). These findings suggest that despite being an aversive experience, boredom can be positive in light of its psychological functions.

Much like other "negative" emotions, typifying boredom as purely problematic would be overly simplistic if not dangerous, as boredom not only offers at least occasional positive outcomes and serves the potentially adaptive psychological function in steering people towards novel and meaningful situations. Accordingly, people's boredom beliefs are perhaps heterogenous, in line with the diverse set of concomitants and consequences that boredom can have. Research on emotion beliefs suggests that, in turn, these beliefs might shape how people interact with boredom. Perhaps those adamant about boredom's positive qualities endure, rather than avoid, this emotion. Perhaps people who regard boredom a negative influence in their lives may be more likely to suffer its vices than virtues.

4.1.4 Current Research

The current research was guided by a core question—what beliefs about boredom do people hold? We sought to identify key lay beliefs about boredom using both qualitative and quantitative methods. To achieve this goal, we conducted three studies following the steps below: In Study 1, (i) we conducted a

series of interviews to understand how people evaluate boredom. We then qualified the strengths of these beliefs through the process of scale development. Based on the interview data, (ii) an initial pool of items was generated. In Study 2, (iii) we administered these items in two samples, with their factor structure examined using both exploratory and confirmatory factor analyses. Also, (iv) we tested the measurement invariance, internal consistency, and test-retest reliability of the resultant scale. In Study 3, (v) we examined the scale's convergent, discriminant, and incremental validity, as well as its associations with boredom.

4.2 Study 1: Qualitative Interviews

We first conducted a series of qualitative interviews to identify what lay beliefs people have about boredom. There were two reasons why we adopted a bottom-up approach to investigate our research question. First, to the best of our knowledge, there has not been any qualitative studies on emotion beliefs, let alone boredom beliefs. A qualitative investigation could potentially provide new insights that were beyond the current literature. Second, also to the best of our knowledge, existing measures on emotion beliefs, such as the Emotion Beliefs Questionnaire (Becerra et al., 2020), Attitudes Toward Emotions Scale (Harmon-Jones et al., 2011), Individual Beliefs about Emotion (Veilleux, Chamberlain, et al., 2021), Lay Theories about Functionality of Emotion (Karnaze & Levine, 2018), were all developed from academic theories or clinicians' expertise rather than beliefs learnt from lay people. Given that we sought to investigate *how people think about* boredom, we deemed it important to understand this from lay people.

4.2.1 Method

Participants and Procedures

A total of 12 individual interviews (n = 12) and four focus-group interviews (n = 17) were conducted with university students recruited from the University of Hong Kong. These interviews were semi-structured, conducted in Cantonese, and each lasted approximately one hour. Each focus group was comprised of four or five participants. The purpose of the interviews was to understand how people experience, perceive and cope with boredom; only findings related to this study are reported. All the interviewees were informed about the interviews' purpose. They were asked to reflect on their personal

experiences and answer some semi-structured questions, such as "how do you perceive boredom?" and "please define boredom," with their answers followed by probes. Earlier interviews helped inform the questions of later ones. The study was approved by the Human Research Ethics Committee at the University of Hong Kong (ref: EA1711045).

Analysis

All the interviews were audio recorded and transcribed verbatim in Cantonese. Thematic analysis was undertaken following the steps proposed by Braun and Clarke (2006). First, I familiarized myself with the data through transcribing some of the interviews, reading and re-reading the transcripts. Second, I collated all the excerpts related to beliefs about boredom as one code using NVivo software. Third, I searched for patterns (themes) within the code. These themes were then reviewed, named, and defined.

4.2.2 Results

Five key themes related to people's lay beliefs about boredom were identified. They were (1) the "value" of boredom, (2) negative, (3) neutral or positive, and (4) mixed evaluations of boredom, as well as (5) the controllability of boredom. Some excerpts were translated into English and reported below as examples.

Theme 1: Value of Boredom

Participants mentioned several valuable aspects boredom. Some described boredom as a motivator for change:

'It motivates you to do other stuff.' (FG1PA)

'I think it helps people seek varieties. Like if you had done the same thing to an extent of feeling bored, you would tend to try out new things.' (FG4PA)

Many suggested that boredom helps them differentiate what is interesting or meaningful to them:

'Perhaps boredom helps you decide what to do…. Since you had experienced boredom, you could weigh whether that thing is worth doing.' (FG2PA)

'You need to know what is boring to know what is interesting.' (FG3PA)

'It helps you explore your own interests. Some people find mathematics fun but I find it boring—that has already drawn a difference.' (FG4PD)

In addition, a participant stated that boring situations help train one's patience:

'I think boredom has certain values of existence. Boredom often makes people realize the thing [that they are doing] is not necessarily something they desire to do. This is the first point. Second, many times boring situations can cultivate one's patience. This is a very important character, in my opinion…For some people…they start to get emotionally unstable once they feel bored. But if we get in touch with boredom more often, we can be a little calmer.' (FG3PD)

Theme 2: Negative Evaluations of Boredom

Many participants viewed boredom in a negative light. They described boredom as a negative emotion and expressed that they were afraid of being bored. They tied boredom to a waste of time and associated it with situations that are of little to do:

'It is definitely a feeling that I don't like…You feel like you have wasted a period of time… like wasted a day and not knowing what have been done.' (IN1)

'I'm afraid of being bored because having nothing to do seems like a waste of time.' (FG2PA)

Some explained that they found boredom aversive because it leads to other negative emotions:

'It's like boredom could… potentially lead to a lot of negative emotions. Imagine if you were bored and you couldn't find your friends, you would feel lonely. Feeling lonely, you might blame your friends for not hanging out with you; this might lead to anger…. Finding yourself with nothing to do and no one around you, you might feel uncared for.' (FG2PA)

Several participants mentioned that they would do what it takes to avoid feeling bored.

'Of course, boredom is better than anger or sadness, because in the end it is comparatively less negative. And of course, boredom is still not a good feeling. Like I would try my best to minimize the possibility of the occurrence of this feeling.' (IN1)

'I think boredom is a negative emotion, that it drags down your mood… I wouldn't enjoy being bored and I will try my best to escape from it.' (FG1PD)

Theme 3: Neutral or Positive Evaluations of Boredom

While some participants hated feeling bored, others expressed that boredom was just a natural emotional response that was neither positive nor negative:

'I think boredom is something that naturally arises… so I think it's not a big deal. Being bored or not doesn't really matter.' (FG2PB)

'I think it is just one kind of emotions; it can't be specifically defined as positive or negative.' (FG3PD)

A participant highlighted that whether boredom was positive or negative depended on how people chose to handle it.

'To me, it is a neutral thing, like it can't be categorized as positive or negative. It depends on how you make use of boredom this emotion and how you view it. If you felt bored and you could intentionally find a hobby to engage with, you would be able to get pass the emotion quickly. However, if you were bored but you just sat there and did nothing, this would lengthen the time of being bored and potentially bring other distressing emotions.' (FG2PC)

Some participants found boredom good in busy season of their lives:

'If I am very busy for the time being…. I think boredom is quite good because being bored means that you can be a bit distracted.' (FG3PA)

Some mentioned that they would allow themselves feeling bored:

'Boredom is a very normal thing so [I would] allow the existence of this feeling.' (IN2).

Theme 4: Mixed Evaluations of Boredom

Some participants held mixed feelings towards boredom. Whereas they viewed it as a negative emotion, they appreciated the functions of it:

'Sometimes [I] think boredom isn't good because it's like [you're] doing nothing, like [you're] having no purpose. It's a waste of time. But sometimes [I] think that boredom provides people with a period of time to rest and wind down.' (FG2PB)

'I think boredom… is not necessarily a good emotion…. It's a negative emotion brought by a doubt in what I'm doing. However, this negative emotion often leads me to explore other things that [I] want to do.' (FG2PD)

Theme 5: Controllability of Boredom

The opinions on whether boredom is controllable were contrasting:

'It's a feeling. Uncontrollable. It's simply the way I see things, that it isn't something interests me.' (IN12)

'[I think boredom is] Controllable. Because if you start feeling bored, you can do other things to make yourself less bored.' (FG1PA)

'I think reducing boredom is possible, but if it's about controlling it… Controlling sounds like you could control its amount—how much of boredom or making boredom disappear…Sometimes I try to reduce boredom but controlling it seems to be a bit difficult.' (FG2PB)

4.2.3 Discussion

Study 1 explored what lay boredom beliefs people hold through a series of individual and focus group interviews. Our findings revealed that participants saw some value in boredom. To some, boredom is a motivator for change, an experience that cultivates one's patience, as well as an indicator that helps one differentiate what is truly meaningful or interesting. These findings are consistent with the propositions that boredom is a functional emotion that informs people about their goals and interests, while motivating behavioural changes in search for novel experiences (Bench & Lench, 2013; Elpidorou, 2014; Wolff & Martarelli, 2020).

Many participants held negative evaluations of boredom, describing it as bad and as a waste of time. One reason why they viewed it so negatively was its co-occurrence with other negative emotions like sadness and loneliness. They were afraid of being bored and would try their best to shut out this feeling. In contrast, some participants believed boredom to be a natural emotional response and they were alright with feeling bored. Some even considered boring time to be good in busy seasons of their lives. These two themes, negative versus neutral or positive evaluations of boredom, resemble the belief on whether an emotion is good or bad (e.g., Ford & Gross, 2019; Harmon-Jones et al., 2011). Yet, these beliefs were not always dichotomous—some deemed boredom to be a negative feeling on the one hand while appreciating its functions on the other.

In terms of controllability, some believed boredom to be uncontrollable, others believed it to be controllable. This aligns with the entity (i.e., viewing

emotions as uncontrollable) and incremental (i.e., viewing emotions as malleable) beliefs about emotion in the literature (e.g., Ford, Lwi, et al., 2018; Tamir et al., 2007). Adding more nuances to the issue, several participants expressed that boredom could be alleviated but not controlled. Taken together, qualitative findings from Study 1 offered rich insights on lay beliefs about boredom. Based on these findings, in Study 2, we developed a scale that would allow us to assess and investigate these beliefs.

4.3 Study 2: Scale Development and Validation

To quantify the boredom beliefs identified in Study 1, we followed the procedures of scale development. We first generated a pool of items from the interview data and administered them via an online questionnaire in a HK sample and a US sample; participants from the HK sample filled out the survey twice in a two-week time interval. Next, we examined the factor structure of the generated items using exploratory factor analysis (EFA) in the HK Time 1 sample, and validated it using confirmatory factor analysis (CFA) in the HK Time 2 sample and the US sample. We tested measurement invariance across time (HK Time 1 and 2 samples) and across cultural groups (HK Time 1 and US samples). After that, we evaluated the psychometric properties of the scale, including its internal consistency, test-retest reliability, and construct validity.

4.3.1 Method

Generation of Initial Item Pool

Transcripts of the 12 individual interviews (n = 12) and four focus-group interviews (n = 17) in Study 1 were reviewed by the research team; extracts related to lay beliefs about boredom were selected and discussed. All of these extracts were turned into statements, which led to an initial pool of 46 items (listed in Table 4.1). After that, these items were translated into English. Each item presents an evaluation about boredom, such as “Boredom drives me to try something new” and “I hate being bored.” The instructions asked participants to rate their level of agreement with each item on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*).

Participants

Analyses were conducted on two samples collected in HK and the US. For the first sample, we recruited 285 participants from the University of Hong Kong.

Of these, 52 participants who failed either of the two attention check items and one participant aged under 18 were excluded, resulting in a sample of 231 participants (64.1% female; age range = [18, 71], *M* = 27.6, *SD* = 12.5). In this sample, 206 (89.2%) of the participants responded to a follow-up survey two weeks later for test-retest reliability. Excluding three participants who failed an attention check gave us valid retest data of 203 participants.

Data for the second sample were collected online through Amazon's Mechanical Turk (MTurk). As data quality control, we only permitted MTurk workers residing in the US who had approval rates over 90% to participate in the study (see Lac & Luk, 2019; Rancourt et al., 2019). A total of 536 participants took part in the study. After excluding 41 participants who failed either of the two attention check items, the sample comprised of 495 participants (46.5% female; age range = [18, 73], *M* = 35.8, *SD* = 11.5).

Procedure and Measures

Participants completed an online survey reporting demographics information, boredom proneness, as well as the 46 items on boredom beliefs in English. The Boredom Proneness Scale (BPS; Farmer & Sundberg, 1986) is a 28-item scale assessing individuals' tendencies to experience boredom (e.g., "I often find myself with nothing to do, time on my hands"). We used the improved 7-point scale version (e.g., Goldberg et al., 2011; Mercer-Lynn et al., 2013; 1 = *strongly disagree*, 7 = *strongly agree*) in this study (HK sample: α = .79; US sample: α = .88).

Data Analysis

To examine the factor structure of the initial items, we followed the recommended practice by Henson and Roberts (2006). First, we used parallel analysis (Horn, 1965) and Velicer's minimum average partial (MAP; Velicer, 1976) to determine the optimal number of factors. An exploratory factor analysis (EFA) with maximum likelihood estimation using oblique rotation was then performed on the correlation matrix of the 46 items in the HK Time 1 sample.

Second, we conducted a confirmatory factor analysis (CFA) in the HK Time 2 sample and the US sample to examine whether the factor structure identified in the HK Time 1 sample provided an adequate description of the structure underlying the items. In accordance with Hu and Bentler (1999), we

considered the model was adequately fitted to the data if its robust confirmatory fit index (CFI) and robust Tucker–Lewis index (TLI) were greater than .90, and robust root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) were less than .08.

Third, a multigroup CFA was conducted to test measurement invariance of the scale across time (2-week interval in HK sample), and across two cultural groups (HK Time 1 and US samples). At successive steps, we (i) estimated a configural invariance model to test whether the factor structure was significantly invariant across the two groups, (ii) constrained factor loadings to test metric invariance, and then (iii) constrained intercepts to test scalar invariance. The metric invariance model was compared against the configural invariance model, whereas the scalar invariance model was compared against the metric invariance model. If the change of CFI (ΔCFI) does not exceed .010 (Cheung & Rensvold, 2002) and the RMSEA value falls within the comparing model's RMSEA 90% confidence intervals (Timmons, 2010), invariance is established.

After that, we evaluated the psychometric properties of the scale, including its internal consistency and test-retest reliability. The internal consistency of the scale was tested using Cronbach alphas, while test-retest reliability was analysed using intraclass correlations (ICC) computed across a 2-week time interval in a subset (n = 203) of the HK sample. We also examined the association of the scale with boredom proneness as a pilot test of the scale's validity.

4.3.2 Results

Items' descriptive, including mean, standard deviation, range, skewness, and kurtosis, in the HK sample are reported in Table 4.1.

Table 4.1
Items for Potential Inclusion in the Boredom Beliefs Scale in Study 2's HK Time 1 Sample

	Item	M	SD	Range	Skewness	Kurtosis
1	People should learn to endure boredom	5.02	1.18	1-7	-0.46	0.31
2	**Sometimes people have to learn to live with boredom**	5.45	1.09	1-7	-0.54	1.15
3	Boredom offers me a time to rest	4.61	1.53	1-7	-0.28	-0.67
4	Boredom gives me time to pause.	4.74	1.39	1-7	-0.39	-0.11
5	Boring situations can develop one's patience	4.86	1.31	1-7	-0.64	0.32
6	Boredom has its function and values	5.18	1.23	1-7	-0.69	0.51
7	Boredom motivates me to reflect on my life	4.58	1.34	1-7	-0.43	-0.21
8	Boredom makes me review my daily life	4.46	1.36	1-7	-0.41	-0.35
9	**Boredom motivates me to make changes or adjustments**	4.78	1.12	1-7	-0.56	0.40
10	**Boredom drives me to try something new**	4.87	1.12	1-7	-0.82	0.85
11	**Boredom motivates me to do something different**	4.85	1.13	1-7	-0.44	0.16
12	**Boredom helps me explore my interests**	4.70	1.32	1-7	-0.72	0.34
13	**Boredom drives me to explore other things that I would like to do**	4.96	1.19	1-7	-0.75	0.53
14	**Boredom allows me to distinguish what truly interests me**	4.81	1.25	1-7	-0.65	0.19
15	**Boredom allows me to distinguish things that are truly meaningful to me**	4.76	1.25	1-7	-0.57	0.23
16	You have to know what is boring to understand what is interesting	4.77	1.47	1-7	-0.71	0.03
17	Boredom helps me find out the direction in my life	4.29	1.35	1-7	-0.33	-0.27
18	Boredom helps me determine what I should do	4.41	1.25	1-7	-0.37	-0.20
19	**Boredom prompts me to change or escape from the current situation**	4.68	1.15	1-7	-0.63	0.71
20	**I am afraid of being bored**	3.85	1.59	1-7	0.17	-0.83
21	People should not feel bored all the time	4.22	1.71	1-7	-0.21	-0.91
22	**I hate being bored**	4.11	1.55	1-7	0.09	-0.69
23	Boredom prevents me from concentrating	4.04	1.46	1-7	-0.01	-0.78
24	Boredom leads me to think about negative things	3.91	1.41	1-7	0.11	-0.55
25	Boredom makes me think too much	4.26	1.43	1-7	-0.02	-0.78
26	Boredom is unconstructive	3.41	1.38	1-7	0.46	-0.23
27	Boredom is a bad emotion	3.02	1.34	1-7	0.60	0.20
28	There is nothing good for being bored	3.01	1.41	1-7	0.81	0.43

29	Being bored is a waste of time	3.55	1.50	1-7	0.45	-0.52
30	Being bored means there is nothing to do	3.24	1.58	1-7	0.43	-0.59
31	**Boredom drags down my mood**	4.25	1.39	1-7	-0.16	-0.57
32	Boredom elicits other negative emotions	4.02	1.26	1-7	-0.25	-0.42
33	Boredom makes me feel irritated	3.59	1.40	1-7	0.03	-0.69
34	Boredom is just a kind of emotion. It is neither good nor bad.	4.95	1.43	1-7	-0.59	0
35	**Boredom is a natural emotional response**	5.38	1.15	1-7	-0.97	2.37
36	**It is okay to feel bored**	5.25	1.26	1-7	-0.77	0.94
37	I need to get rid of boredom	3.74	1.45	1-7	0.21	-0.64
38	I must minimize the possibility of feeling bored	4.10	1.35	1-7	-0.02	-0.64
39	I don't allow myself to feel bored	3.39	1.48	1-7	0.41	-0.58
40	Feeling bored signals that I have to find something more meaningful to do	4.68	1.24	1-7	-0.78	0.42
41	**Boredom motivates me to find something more meaningful to do**	4.89	1.16	1-7	-0.74	0.80
42	Boredom makes me aware that the thing I am doing is not the thing I want to do most	4.92	1.29	1-7	-0.71	0.33
43	It is impossible for anyone to enjoy feeling bored	3.70	1.60	1-7	0.14	-0.88
44	If I have a choice, I would rather not have boredom exist in this world	3.47	1.55	1-7	0.33	-0.44
45	Just as without sadness, there can be no happiness, without boredom, things that are interesting would not stand out	4.77	1.40	1-7	-0.52	-0.07
46	Just as without sadness, there can be no happiness, without boredom, you would not be able to understand how it feels doing something interesting	4.83	1.45	1-7	-0.56	-0.26

Note. Participants received the following instructions: "The following are some statements that may or may not describe how you view boredom as a feeling. Please rate on a 7-point scale to indicate the extent to which you agree with each statement. There are no right or wrong answers. We are interested in your thoughts about boredom, not in how others think about it." Items were rated on a scale of (1) strongly disagree to (7) strongly agree. Items in boldface were those selected for the final measure.

Exploratory Factor Analysis

We conducted a EFA on the correlation matrix of the 46 items assessed in the HK sample (first time-point) using maximum likelihood estimation. Both parallel analysis and Velicer's MAP recommended a four-factor solution for the items. Four factors were extracted and rotated using oblique rotation as correlation between factors was expected. Table 4.2 presents the items' factor loadings and communalities, as well as the factors' eigenvalues and explained variances.

Collectively, the four factors accounted for 39% of the total item variance. Among the original 46 items, there were items with low individual loadings and excessive cross-loadings. We retained 15 items with loadings greater than .60 on intended factor and smaller than .20 on other factors (see Steger et al., 2006). For example, we retained item 9 because its loading on Factor 1 was greater than .60 while its loadings on Factors 2, 3 and 4 were smaller than .20. Since the two items loaded on Factor 4 had loadings smaller than .60, these two items, which constituted Factor 4, were removed in this procedure.

For the three remaining factors, the first factor was labelled *boredom functionality*; it had nine items tapping a belief related to recognizing the functions of boredom, such as how it motivates people to engage in something new and how it helps people understand their interests. The second factor was labelled *boredom dislike*; it contained three items capturing negative affective evaluation of boredom. The third factor was labelled *boredom normalcy*; it consisted of three items tapping a belief that the experience of boredom is normal.

Table 4.2

Summary of Exploratory Factor Analysis Results using Maximum Likelihood Estimation with Oblique Rotation in Study 2's HK Time 1 Sample

Factor		Item	Factor loadings				h^2
			Factor 1	Factor 2	Factor 3	Factor 4	
Factor 1							
	5	Boring situations can develop one's patience	0.34	-0.09	0.32	-0.05	0.28
	9	**Boredom motivates me to make changes or adjustments**	**0.65**	0.03	0.00	0.15	0.51
	10	**Boredom drives me to try something new**	**0.66**	-0.04	-0.05	0.06	0.45
	11	**Boredom motivates me to do something different**	**0.74**	-0.10	-0.08	-0.02	0.50
	12	**Boredom helps me explore my interests**	**0.64**	-0.09	0.01	0.17	0.50
	13	**Boredom drives me to explore other things that I would like to do**	**0.66**	0.13	0.11	-0.06	0.50
	14	**Boredom allows me to distinguish what truly interests me**	**0.77**	0.02	0.09	-0.05	0.62
	15	**Boredom allows me to distinguish things that are truly meaningful to me**	**0.70**	-0.07	0.02	0.07	0.52
	16	You have to know what is boring to understand what is interesting	0.36	0.09	0.33	-0.02	0.30
	17	Boredom helps me find out the direction in my life	0.46	-0.17	-0.04	0.41	0.49
	18	Boredom helps me determine what I should do	0.51	0.02	-0.06	0.19	0.34
	19	**Boredom prompts me to change or escape from the current situation**	**0.62**	0.20	0.04	-0.03	0.46
	40	Feeling bored signals that I have to find something more meaningful to do	0.35	0.29	-0.20	0.02	0.27
	41	**Boredom motivates me to find something more meaningful to do**	**0.73**	0.01	-0.05	0.12	0.58
	42	Boredom makes me aware that the thing I am doing is not the thing I want to do most	0.40	0.18	-0.02	0.06	0.22
	45	Just as without sadness, there can be no happiness, without boredom, things that are interesting would not stand out	0.48	0.15	0.37	-0.21	0.44
	46	Just as without sadness, there can be no happiness, without boredom, you would not be able to understand how it feels doing something interesting	0.51	0.03	0.34	-0.25	0.43
Factor 2							
	20	**I am afraid of being bored**	0.00	**0.68**	-0.03	0.06	0.47
	21	People should not feel bored all the time	0.20	0.26	-0.05	-0.07	0.13
	22	**I hate being bored**	-0.01	**0.79**	0.02	-0.10	0.64
	23	Boredom prevents me from concentrating	0.07	0.40	0.12	-0.13	0.17
	24	Boredom leads me to think about negative things	-0.03	0.51	-0.01	0.28	0.33

25	Boredom makes me think too much	-0.08	0.50	0.20	0.49	0.44
26	Boredom is unconstructive	-0.02	0.38	-0.27	-0.10	0.30
27	Boredom is a bad emotion	0.04	0.32	-0.51	0.05	0.44
28	There is nothing good for being bored	0.09	0.32	-0.36	-0.03	0.29
29	Being bored is a waste of time	-0.02	0.51	-0.23	-0.05	0.38
30	Being bored means there is nothing to do	-0.09	0.34	-0.10	0.04	0.15
31	**Boredom drags down my mood**	-0.02	**0.69**	0.05	-0.01	0.45
32	Boredom elicits other negative emotions	0.14	0.29	-0.12	0.05	0.14
33	Boredom makes me feel irritated	-0.10	0.55	0.08	0.06	0.28
37	I need to get rid of boredom	0.17	0.53	-0.31	-0.05	0.50
38	I must minimize the possibility of feeling bored	0.18	0.51	-0.14	0.01	0.37
39	I don't allow myself to feel bored	0.09	0.54	-0.19	-0.05	0.40
Factor 3						
1	People should learn to endure boredom	0.14	0.07	0.45	0.03	0.25
2	**Sometimes people have to learn to live with boredom**	0.07	0.03	**0.60**	-0.03	0.37
3	Boredom offers me a time to rest	0.00	-0.08	0.48	0.24	0.35
4	Boredom gives me time to pause.	0.05	-0.14	0.43	0.35	0.43
6	Boredom has its function and values	0.11	-0.17	0.51	0.18	0.45
34	Boredom is just a kind of emotion. It is neither good nor bad.	-0.09	0.01	0.57	-0.02	0.30
35	**Boredom is a natural emotional response**	0.12	0.12	**0.68**	0.06	0.52
36	**It is okay to feel bored**	0.00	-0.17	**0.65**	-0.02	0.51
43	It is impossible for anyone to enjoy feeling bored	0.15	0.08	-0.25	-0.19	0.11
44	If I have a choice, I would rather not have boredom exist in this world	0.01	0.34	-0.40	-0.02	0.35
Factor 4						
7	Boredom motivates me to reflect on my life	0.33	-0.11	0.09	0.57	0.60
8	Boredom makes me review my daily life	0.30	0.07	0.03	0.59	0.57
	Pre-rotation					
	Eigenvalues	8.41	6.67	1.74	1.29	
	% of variance	18	15	4	3	
	Post-rotation					
	Eigenvalues	6.60	5.09	4.46	1.96	
	% of variance	14	11	10	4	
	Total variance				39%	

Note. h^2 = communalities. Items with loadings > .60 on the intended factor and < .20 on other factors are listed in boldface type and retained for that factor.

Confirmatory Factor Analysis

We then cross-validated the three-factor structure on the 15 items using CFA with robust maximum likelihood estimator with HK Time 2 sample (n = 203). The three-factor model demonstrated good model fit in the CFA, Robust $\chi^2(87) = 97.37$, $p = .210$; Robust CFI = .988; Robust TLI = .986; Robust RMSEA = .031, 90% *CI* [.000, .060]; SRMR = .058. Standardized factor loadings ranged from .60 to .83 for boredom functionality, .74 to .79 for boredom dislike, and .46 to .92 for boredom normalcy (Table 4.3). All the items loaded significantly ($p < .001$) on the respective factors. The three-factor model was significantly better fitting than a single factor model, $\Delta\chi^2 = 549.62$, $p < .001$; Δ Robust CFI = -.247; Δ Robust TLI = -.288, Δ Robust RMSEA = .110, Δ SRMR = .085.

We further tested the fit of the three-factor model by conducting a confirmatory factor analysis for the US sample data. Results showed that the model had acceptable fit to the data, Robust $\chi^2(87) = 212.98$, $p < .001$; Robust CFI = .926; Robust TLI = .911; Robust RMSEA = .068, 90% *CI* [.056, .079]; SRMR = .057. Standardized factor loadings ranged from .58 to .77 for boredom functionality, .52 to .81 for boredom dislike and .57 to .69 for boredom normalcy (Table 4.3). All the items loaded significantly ($p < .001$) on the respective factors. The three-factor model was significantly better fitting than a single factor model, $\Delta\chi^2 = 1616.5$, $p < .001$; Δ Robust CFI = -.159; Δ Robust TLI = -.183, Δ Robust RMSEA = .050, Δ SRMR = .043.

Measurement Invariance

Across Time. We first examined the temporal invariance of the factor structure across the two time points with a two-week interval in the HK sample (Table 4.4). We found configural invariance (CFI = .947; RMSEA = .063) and then constrained the factor loadings to be equal across both time points for testing metric invariance, and further restricted the item intercepts to be equivalent to examine scalar invariance. Both metric and scalar invariance were supported.

Across Cultural Groups. We further examined configural invariance to see whether the same factor structure had the best fit for both cultural groups (HK and US samples). As presented in Table 4.5, we found configural invariance (CFI = .919; RMSEA = .072), and metric invariance. Scalar invariance was partially supported; ΔCFI was larger than 0.10 but the RMSEA value fell within the

RMSEA confidence intervals of the comparing model. As such, measurement invariance across the two cultural groups was supported.

Psychometric Properties

Table 4.6 presents the zero-order correlations between the three subscales and other variables, as well as their means, standard deviations, and internal consistency estimates.

The three subscales showed good internal consistency: boredom functionality (HK sample: $\alpha = .90$; US sample: $\alpha = .89$), boredom dislike (HK sample: $\alpha = .75$; US sample: $\alpha = .70$), and boredom normalcy (HK sample: $\alpha = .72$; US sample: $\alpha = .66$). From a subset ($n = 203$) of the HK sample who completed the survey again two weeks later, test-retest reliability was good, with ICCs of .60 for boredom functionality, .75 for boredom dislike, and .59 for boredom normalcy.

Across both HK and US samples, boredom proneness was positively associated with boredom dislike ($r = .25$, $p < .001$ in HK sample; $r = .54$, $p < .001$ in US sample), but not with boredom functionality ($r = -.098$, $p = .137$ in HK sample; $r = -.038$, $p = .404$ in US sample) and boredom normalcy ($r = .006$, $p = .924$ in HK sample; $r = -.031$, $p = .489$ in US sample).

Table 4.3
Standardized Factor Loadings from Confirmatory Factor Analyses of the Final 15 Items in Study 2's HK Time 2 Sample and US Sample

Item		HK Time 2 Sample (n = 203)			US Sample (N = 495)		
		Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
9	Boredom motivates me to make changes or adjustments	0.80			0.76		
10	Boredom drives me to try something new	0.83			0.70		
11	Boredom motivates me to do something different	0.80			0.72		
12	Boredom helps me explore my interests	0.69			0.68		
13	Boredom drives me to explore other things that I would like to do	0.82			0.74		
14	Boredom allows me to distinguish what truly interests me	0.67			0.65		
15	Boredom allows me to distinguish things that are truly meaningful to me	0.72			0.61		
19	Boredom prompts me to change or escape from the current situation	0.60			0.58		
41	Boredom motivates me to find something more meaningful to do	0.78			0.77		
20	I am afraid of being bored		0.79			0.52	
22	I hate being bored		0.79			0.72	
31	Boredom drags down my mood		0.74			0.81	
2	Sometimes people have to learn to live with boredom			0.46			0.57
35	Boredom is a natural emotional response			0.56			0.63
36	It is okay to feel bored			0.92			0.69

Table 4.4

Goodness-of-fit Indices of the Measurement Invariance Models across Time in Study 2's HK Sample

					Difference tests				
Model	χ^2	*df*	CFI	RMSEA [90% *CI*]	ΔCFI	ΔRMSEA	$\Delta\chi^2$	Δ*df*	*p*
Configural invariance	323.19	174	0.947	0.063 [0.052, 0.073]					
Metric invariance	363.73	186	0.937	0.066 [0.056, 0.076]	-0.01[a]	0.003	40.541	12	< .001
Scalar invariance	366.43	198	0.940	0.063 [0.053, 0.073]	0.003[b]	-0.003	2.704	12	.997

Note. df = degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; 90% *CI* = 90% confidence interval.

[a]Difference between configural and metric invariance models.

[b]Difference between metric and scalar invariance models.

Table 4.5

Goodness-of-fit Indices of the Measurement Invariance Models across Study 2's HK and US Samples

					Difference tests				
Model	χ^2	*df*	CFI	RMSEA [90% *CI*]	ΔCFI	ΔRMSEA	$\Delta\chi^2$	Δ*df*	*p*
Configural invariance	498.28	174	0.919	0.072 [0.064, 0.079]					
Metric invariance	535.55	186	0.913	0.072 [0.065, 0.079]	0.006[a]	0	37.273	12	< .001
Scalar invariance	610.81	198	0.897	0.076 [0.069, 0.083]	0.016[b]	0.004	75.262	12	< .001

Note. df = degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; 90% *CI* = 90% confidence interval.

[a]Difference between configural and metric invariance models.

[b]Difference between metric and scalar invariance models.

Table 4.6

Reliabilities, Means, Standard Deviations, and Correlations of the Measured Variables in Studies 2 and 3

	M	SD	α	Boredom functionality	Boredom dislike	Boredom normalcy
Study 2 HK Sample (*N* = 231)						
Boredom functionality	4.81	0.88	.90	-		
Boredom dislike	4.07	1.23	.75	.09	-	
Boredom normalcy	5.36	0.94	.72	.30***	-.20**	-
Boredom proneness	102.57	15.78	.79	-.10	.25***	.01
Study 2 US Sample (*N* = 495)						
Boredom functionality	4.95	1.06	.89	-		
Boredom dislike	4.39	1.45	.70	.21***	-	
Boredom normalcy	5.16	1.09	.66	.43***	-.06	-
Boredom proneness	106.05	23.75	.88	-.04	.54***	-.03
Study 3 UK Sample (*N* = 296)						
Boredom functionality	4.51	1.06	.91	-		
Boredom dislike	4.20	1.30	.70	.10	-	
Boredom normalcy	5.39	0.99	.58	.13*	-.14*	-
Boredom proneness	20.90	6.82	.87	-.22***	.35***	0
Boredom frequency	4.99	1.87	-	-.10	.32***	.13*
Boredom intensity	4.90	1.92	-	-.03	.50***	.06
Perceived life boredom	3.37	1.59	-	-.26***	.20***	.07
Lay theories that emotion helps	3.99	0.67	.71	.29***	.10	.22***
Lay theories that emotion hinders	2.04	0.73	.70	-.13*	-.02	-.15**
Emotion acceptance	10.29	2.95	.48[a]	.12*	-.12*	.17**
FFMQ-NJ	3.05	0.93	.92	.10	-.32***	.04
NAV	3.01	0.72	.83	.05	-.09	-.01
NAV pleasantness	2.19	0.87	.62	.01	-.10	-.06
NAV utility	2.59	0.87	.58	.03	-.05	-.04
NAV appropriateness	3.62	0.91	.56	.03	-.14*	.03
NAV meaningfulness	3.64	0.98	.59	.07	0	.03
NAV (boredom)	3.40	0.90	.71	.11	-.48***	.21***
NAV (boredom) pleasantness	2.90	1.24	.30[a]	.01	-.58***	.16**
NAV (boredom) utility	3.35	1.22	.13[a]	.08	-.36***	.09
NAV (boredom) appropriateness	4.08	1.16	.12[a]	.09	-.22***	.20***
NAV (boredom) meaningfulness	3.26	1.22	.21[a]	.15**	-.26***	.16**

Note. NAV = Negative Affect Valuation, FFMQ-NJ = non-judgment subscale of the Five-facet Mindfulness Questionnaires.

* $p < .05$, ** $p < .01$, *** $p < .001$.

[a]Inter-item correlation.

4.3.3 Discussion

Study 2 developed and validated a 15-item self-report measure to assess people's lay beliefs about boredom—the Boredom Beliefs Scale (BBS). We generated 46 items from the interview data in Study 1 and administered them to HK and US samples. Some items which showed low individual loadings and excessive cross-loadings in EFA were eliminated. The remaining 15 items were then subjected to CFAs, which indicated that a three-factor solution best fit the data. The three subscales were labelled as boredom functionality, boredom dislike and boredom normalcy. They were invariant across two-week time and across two samples, indicating that the same constructs were measured across time and cultural groups. These subscales demonstrated excellent internal consistencies and test-retest reliabilities over a 2-week period. The ICCs are comparable to those of emotion beliefs found in the study by Veilleux, Warner and colleagues (2021). Preliminary test of the scale suggests that, among the three boredom beliefs, only boredom dislike was positively associated with boredom proneness. To further investigate the scale's validity, we conducted a third study.

4.4 Study 3: Convergent, Discriminant and Incremental Validity

The purpose of Study 3 was twofold: (i) to assess the convergent, discriminant and incremental validity of the BBS, and (ii) to examine its associations with boredom. All the hypotheses are outlined in Table 4.7. Since boredom functionality is about endorsing the values of boredom, we expected it to be positively associated with emotion acceptance and lay theories that emotion helps (H1a-H1f). If boredom dislike is a negative affective evaluation of boredom, it should show negative associations with emotion acceptance and non-judgement of inner experience (H2a-H2f). Since boredom normalcy is about believing boredom to be a normal experience, we expected it to be positively associated with accepting and valuing emotion (H3a-H3f).

Table 4.7
An Overview of Hypotheses in Study 3

Hypothesis	Description	Supported?
H1a	Boredom functionality is positively associated with lay theories that emotion helps.	Yes
H1b	Boredom functionality is negatively associated with lay theories that emotion hinders.	Yes
H1c	Boredom functionality is positively associated with emotion acceptance.	Yes
H1d	Boredom functionality is positively associated with FFMQ-NJ.	No
H1e	Boredom functionality is positively associated with NAV.	No
H1f	Boredom functionality is positively associated with the adapted NAV boredom score.	No
H2a	Boredom dislike is negatively associated with lay theories that emotion helps.	No
H2b	Boredom dislike is positively associated with lay theories that emotion hinders.	No
H2c	Boredom dislike is negatively associated with emotion acceptance.	Yes
H2d	Boredom dislike is negatively associated with FFMQ-NJ.	Yes
H2e	Boredom dislike is negatively associated with NAV.	No
H2f	Boredom dislike is negatively associated with the adapted NAV boredom score.	Yes
H3a	Boredom normalcy is positively associated with lay theories that emotion helps.	Yes
H3b	Boredom normalcy is negatively associated with lay theories that emotion hinders.	Yes
H3c	Boredom normalcy is positively associated with emotion acceptance.	Yes
H3d	Boredom normalcy is positively associated with FFMQ-NJ.	No
H3e	Boredom normalcy is positively associated with NAV.	No
H3f	Boredom normalcy is positively associated with the adapted NAV boredom score.	Yes

Note. NAV = Negative Affect Valuation, FFMQ-NJ = non-judgment subscale of the Five-facet Mindfulness Questionnaires.

4.4.1 Method

Participants

We recruited participants via Prolific Academic (www.prolific.ac). Anyone who were British nationals and aged 18 years or above were eligible to take part. Participants received £2.50 in exchange for participation. Based on a power analysis in G*Power 3.1, with a small effect size of $\rho = .16$, a 0.05 alpha

and a 0.80 power, we targeted recruiting around 300 participants. A total of 309 participants responded to the survey. Excluding 13 participants who failed either of the two attention check items resulted in a final sample of 296 participants (79 men, 216 women, 1 other; age range = [18, 75], M = 33.9, SD = 10.7).

Procedure and Measures

Participants completed an online survey which contained the 15-item BBS developed in Study 1 (boredom functionality α = .91; boredom dislike α = .70; boredom normalcy α = .58) as well as the following measures:

Boredom Proneness. We administered the 8-item short Boredom Proneness Scale (SBPS; Struk et al., 2017). Items were responded on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*) and summed to create a composite (α = .87).

Boredom Frequency, Boredom Intensity and Perceived Life Boredom. We administered three items from Chapter 3 to measure participants' boredom frequency ("How often have you felt bored in the last month?": 1 = *none of the time*, 9 = *all of the time*), boredom intensity ("When you feel bored, what is your experience of it like?": 1 = *very mild*; 9 = *very intense*), and perceived life boredom ("My life is boring.": 1 = *strongly disagree*; 7 = *strongly agree*).

Lay Theories about Functionality of Emotion. The scale on lay theories about functionality of emotion (Karnaze & Levine, 2018) contains 8 items that assess people's endorsements of lay theories that emotion helps (e.g., "I believe it's healthy to feel whatever emotion you feel") or hinders (e.g., "Feelings are a weakness humans have"), respectively. Items were rated on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*) that were averaged to form scores of emotion helps (α = .71) and hinders (α = .70).

Emotion Acceptance. The acceptance subscale of Emotion Regulation Scale (ERS-A; Liverant et al., 2008) contains two items: "When I experienced emotions (e.g., sadness, anxiety), I understood that it was o.k. and understandable to feel that way" and "When I experienced emotions (e.g., sadness, anxiety), I allowed myself to feel what I was feeling without trying to change how I felt." They were rated on a 9-point scale (0 = *never*, 8 = *all the time*), and summed to form an acceptance score (r = .48, p < .001).

Non-judgment of Inner Experience. The non-judgment subscale of the Five-facet Mindfulness Questionnaires (FFMQ-NJ; Baer et al., 2006) contains 8 items assessing the extent to which participants habitually accepted their thoughts (e.g., I make judgments about whether my thoughts are good or bad) and emotions (e.g., I criticize myself for having irrational or inappropriate emotions). Items were rated on a scale of 1 (*never or very rarely true*) to 5 (*very often or always true*), and averaged to form an index of non-judgment (α = .92). The subscale was administered in past research to understand how acceptance towards emotion affects psychological health (Ford, Lam, et al., 2018).

Negative Affect Valuation (NAV). The 48-item Negative and Positive Affect Valuation measure (Luong et al., 2016) assesses the frequency participants evaluated three positive (joy, interest, and contentment) and three negative (anger, nervousness, and downcast) emotions. Participants were asked "How often do you experience the feeling of [emotion] as …?" across four facets: *pleasantness* (2 items: "pleasant", "unpleasant (reversed)"; α = .62), *utility/helpfulness* (2 items: "disruptive (reversed)", "helpful"; α = .58), *appropriateness* (2 items: "inappropriate (reversed)", "appropriate"; α = .56), and meaningfulness (2 items: "meaningful", "pointless (reversed)"; α = .59). All responses were made on a scale ranging from 1 (*almost never*) to 7 (*almost always*). The 24 items for negative emotions were averaged to form a composite score (NAV score α = .83), which represents negative affect valuation. In addition to the original three emotions, we added boredom to produce a set of NAV scores for boredom (α = .71; pleasantness $r = .30$, $p < .001$; utility $r = .13$, $p = .027$; appropriateness $r = .12$, $p = .045$; and meaningfulness $r = .21$, $p < .001$).

Data Analysis

We evaluated the convergent and discriminant validity of BBS subscales with bivariate correlations. The subscales were expected to show relevant associations to established instruments measuring emotion beliefs (see Table 4.7). The incremental validity of BBS subscales was explored using a series of hierarchical regression analyses. We tested whether BBS predicted boredom proneness over other emotion belief measures, including lay theories about functionality of emotion, emotion acceptance, non-judgment of inner experience, negative affect valuation, and the adapted NAV boredom score. We entered

emotion beliefs at Step 1 and the BBS subscales at Step 2. The change in R^2 between models was examined. We selected boredom proneness to validate BBS despite its conceptual problems discussed in Chapter 3 as the Boredom Proneness Scale is the most commonly used scale of boredom (Vodanovich & Watt, 2016). Finally, we investigated the relationships of BBS subscales with boredom proneness, boredom frequency, boredom intensity, and perceived life boredom.

4.4.2 Results

Table 4.6 presents the means, standard deviations, zero-order correlations, and internal consistency estimates of the measured variables. Table 4.7 displays an overview of whether the hypotheses were supported.

Convergent and Discriminant Validity

To evaluate the convergent and discriminant validity of BBS, we tested the bivariate correlations between the three subscales and a range of emotion belief measures (Table 4.6). As hypothesized, boredom functionality and boredom normalcy were positively associated with lay theories that emotion helps (H1a & H3a) and emotion acceptance (H1c & H3c); they were negatively associated with lay theories with emotion hinders (H1b & H3b). However, they were not associated with FFMQ-NJ (H1d & H3d). For boredom dislike, it was not associated with lay theories that emotion helps (H2a) or emotion hinders (H2b), but it was negatively associated with emotion acceptance (H2c) and FFMQ-NJ (H2d).

Out of our expectation, the subscales of BBS were not associated with the composite score (H1e, H2e & H3e) and the four facets of NAV. Since the NAV measure asked participants to rate their valuation of anger, nervousness, and downcast, the null associations between NAV and BBS subscales suggest that people have distinct beliefs towards different emotions, and that NAV measure could not capture people's beliefs about boredom as BBS did.

Some subscales of BBS were associated with the adapted NAV boredom scores. Specifically, there was a positive association between boredom functionality and the meaningfulness facet of NAV boredom. Boredom dislike was negatively associated with NAV boredom composite score (H2f) and all four facets. Boredom normalcy was positively associated with NAV boredom

composite score (H3f) and the pleasantness, appropriateness, and meaningfulness facets, but not with the utility facet.

Taken together, the three subscales showed different associations with emotion beliefs, which is indicative of adequate convergent and discriminant validity.

Incremental Validity

In a series of hierarchical regressions, we examined the incremental validity of BBS over other emotion belief measures, including lay theories about functionality of emotion, emotion acceptance, FFMQ-NJ, NAV, and the adapted NAV boredom score, in predicting boredom proneness (Table 4.8). In each analysis, measure(s) of emotion belief was entered at Step 1 and the subscales of BBS were entered at Step 2. As shown in Table 4.8, entering the BBS subscales into the models resulted in significant increases in R^2 in all the analyses (all *p*s < .001). This suggests that BBS has significant incremental validity over other emotion belief measures in predicting boredom proneness.

Table 4.8

Hierarchical Regression Analyses Showing Prediction of Boredom Proneness by Emotion Belief Measures and BBS Subscales in Study 3

Step	Predictor(s)	β	R^2	ΔR^2
1	Lay theories that emotion helps	-.112		
	Lay theories that emotion hinders	.085		
			.030*	
2	Lay theories that emotion helps	-.116		
	Lay theories that emotion hinders	.083		
	Boredom functionality	-.233***		
	Boredom dislike	.409***		
	Boredom normalcy	.130*		
			.227***	.197***
1	Emotion acceptance	-.045		
			.002	
2	Emotion acceptance	.023		
	Boredom functionality	-.274***		
	Boredom dislike	.397***		
	Boredom normalcy	.091		
			.200***	.198***
1	FFMQ-NJ	-.340***		
			.116***	
2	FFMQ-NJ	-.218***		
	Boredom functionality	-.242***		
	Boredom dislike	.321***		
	Boredom normalcy	.089		
			.242***	.126***
1	NAV	-.027		
			.001	
2	NAV	.021		
	Boredom functionality	-.272***		
	Boredom dislike	.396***		
	Boredom normalcy	.095		
			.200***	.199***
1	NAV (boredom)	-.219***		
			.048***	
2	NAV (boredom)	-.026		
	Boredom functionality	-.267***		
	Boredom dislike	.381***		
	Boredom normalcy	.097		
			.200***	.152***

Note. All predictors were centered. NAV = Negative Affect Valuation, FFMQ-NJ = non-judgment subscale of the Five-facet Mindfulness Questionnaires.
* $p < .05$, *** $p < .001$.

Relationships with Boredom

We explored how the three beliefs in BBS relate to boredom experience. As indicated in Table 4.6, boredom functionality was negatively associated with boredom proneness and perceived life boredom, but not with boredom frequency and intensity. Boredom dislike was positively associated with all four boredom indices (boredom proneness, boredom frequency, boredom intensity and perceived life boredom). Boredom normalcy was associated with boredom frequency but not with other boredom indices.

4.4.3 Discussion

Study 3 examined the convergent, discriminant, and incremental validity of the BBS, as well as its associations with boredom. Three boredom beliefs showed meaningful associations with instruments that assess emotion beliefs. Whereas boredom functionality and boredom normalcy were associated with accepting emotions and perceiving them in a positive light, boredom dislike was associated with non-acceptance of emotion and judgement of inner experience.

We found null associations of valuing negative emotions (anger, nervousness, and downcast) with the three subscales. There are two possible explanations for this finding. Considering the high internal consistency of NAV, it is possible that how people evaluate boredom is very different from how they evaluate anger, nervousness, and downcast. Alternatively, it is possible that NAV and BBS capture very different emotion beliefs, that valuation, functionality, dislike, and normalcy are distinct beliefs. This might be attributable to differences in the process of scale development (from academic theories vs. from qualitative study), and differences in measurements. While NAV measures the frequency people experience an emotion as pleasant, useful, appropriate, and meaningful on a scale of 1 (*almost never*) to 7 (*almost always*), BBS measures the extent to which people agree with a series of statements regarding an emotion on a scale of 1 (*strongly disagree*) to 7 (*strongly agree*). Either way, the finding suggests that people possess different beliefs about different emotions (Ford & Gross, 2018; Harmon-Jones et al., 2011).

Results from hierarchal regression analyses demonstrate that BBS outperformed other emotion belief measures in predicting boredom proneness—the most widely used and studied boredom measure in the literature (Vodanovich

& Watt, 2016) despite its conceptual ambiguity (Chapter 3). This suggests that BBS exhibits incremental validity, and it is particularly relevant to boredom.

For the associations between boredom beliefs and boredom experience, not only boredom dislike was positively associated with boredom proneness, which replicated Study 2's results, it was also positively associated with boredom frequency, boredom intensity, and perceived life boredom.

4.5 General Discussion

Boredom is a prevalent emotion that is related to a range of behavioural and well-being outcomes. Considering the importance of emotion beliefs in emotional experience and regulation (Ford & Gross, 2018, 2019), it is crucial to examine what lay beliefs about boredom people hold. To address this question, we started our investigation with a series of qualitative interviews in Study 1. We then quantified these beliefs empirically through the process of scale development. We generated 46 items and administered them to HK and US adult samples in Study 2. The resultant scale—the Boredom Beliefs Scale (BBS)—consists of 15 items which consistently showed a three-factor solution in factor analyses, reflecting boredom functionality, boredom dislike, and boredom normalcy. The three subscales demonstrated scalar invariance across two weeks in the HK sample and metric invariance across the HK and US samples, suggesting that the same constructs were measured across time and cultural groups. These subscales had good internal consistency and test-retest reliability over a 2-week period. We examined their convergent, discriminant, and incremental validity in Study 3. The subscales showed theoretically meaningful associations with relevant emotion beliefs and boredom measures. BBS is thus a factor saturated, reliable, and valid measure for lay boredom beliefs.

Our study was the first to investigate people's lay beliefs about boredom and develop a tool to assess them. We found non-significant associations between negative affect valuation (anger, nervousness and downcast) and the three boredom beliefs in Study 3. This supports the proposition that people have distinct beliefs about different emotions (Ford & Gross, 2018; Harmon-Jones et al., 2011), and highlights the need of developing a specific measure for boredom beliefs. Developing this scale was an essential first step towards investigating the impacts of boredom beliefs on boredom experience, behaviours, and well-being.

Based on our results, boredom beliefs is a multidimensional construct, consistent with the findings by Becerra et al. (2020) that beliefs about emotion construct is multidimensional. Given that two boredom beliefs—good or bad, and functional or not—were postulated from the literature review and five themes were identified in Study 1, the result of a three-factor solution may look surprising at first glance. However, it echoes with Russell's (1930, p. 60) view on how people evaluate boredom: "We are less bored than our ancestors were, but we are more afraid of boredom. We have come to know, or rather to believe, that boredom is not part of the natural lot of man, but can be avoided by a sufficiently vigorous pursuit of excitement."

We found that some people indeed affectively dislike being bored. Boredom dislike subscale contains items such as "I hate being bored" and "I am afraid of being bored." This is consistent with past research which suggests that people hold belief about whether emotions are good or bad (e.g., Ford & Gross, 2019; Harmon-Jones et al., 2011). Compared with the other two boredom beliefs, it most resembles the valuing and accepting of negative emotions proposed in the emotion belief literature, as indicated by its associations with FFMQ-NJ and the adapted NAV boredom scores in Study 3.

Some people believe that boredom is (or is not) a normal experience. Boredom normalcy subscale contains items such as "Boredom is a natural emotional response" and "It is okay to feel bored."

Some people recognize the functions of boredom. Boredom functionality subscale contains items such as "Boredom motivates me to make changes or adjustments" and "Boredom allows me to distinguish things that are truly meaningful to me." This appears to be related to the belief about how useful an emotion is (Becerra et al., 2020; Ford & Gross, 2018; Tamir et al., 2015). Yet, in Study 3, boredom functionality was not associated with the utility facet of NAV boredom (how helpful boredom is) and it was positively associted with meaningfulness facet of NAV boredom (how meaningful boredom is). This suggests that the belief catpures something more than viewing boredom as either useful or not, entailing an endorsement of the value of boredom.

It is notable that, to our knowledge, no measure of emotion belief similar to boredom normalcy and boredom functionality has been proposed in the

literature. The weak to null associations of these subscales with other emotion belief measures suggest that they are rather unique. Previous research suggests that people perceive emotion as good or bad (Ford & Gross, 2019), liked or disliked (Netzer et al., 2018). Our results indicate that boredom dislike and boredom normalcy are not at opposing ends of the same spectrum. Their association was negative in Study 2's HK sample and Study 3's sample, and non-significant in Study 2's US sample. This indicates that disliking boredom and normalizing its experience represent different facets of boredom beliefs. For the association between boredom functionality and boredom dislike, it was not significant in Study 2's HK sample and Study 3's sample, but significant and positive in Study 2's US sample, illustrating that some people might appreciate the functions of boredom while disliking it. This echoes with Study 1's qualitative findings that some people hold mixed evaluations of boredom.

Furthermore, our results provide exploratory but novel insights into the relationship between boredom beliefs and experience. Boredom is an avoidance-oriented emotion; the propensity to it was linked with dispositional avoidance motivation (Mercer-Lynn et al., 2014). Among the three subscales, only boredom dislike was consistently positively associated with boredom proneness across all samples; it also showed positive associations with all four boredom indices (boredom proneness, boredom frequency, boredom intensity, and perceived life boredom) in Study 3. It suggests that the more likely people experience boredom, the more they hate being bored. This is in line with Harmon-Jones et al. (2011)'s prediction that, for avoidance-oriented emotions, higher trait level of the emotion is associated with greater disliking of that emotion. Boredom functionality and boredom normalcy showed inconsistent associations with boredom across the three samples; this might be attributed to the fact that 46 items were administered in Study 2's HK and US samples whereas the final 15-item version was used in Study 3. Interestingly, in Study 3, boredom functionality showed negative associations with boredom proneness and perceived life boredom, but not with frequency and intensity of boredom. This points to the possibility that boredom functionality pertains to one's perceptions and reappraisals rather than affective experiences. Considering the evidence from Chapter 3 that perception of life being boring had greater implications on psychological well-being than actual

experience of boredom, boredom functionality may serve as a target of intervention. Yet, future research is needed to clarify their relationships.

Taken together, the three subscales were found to be tapping into different boredom beliefs, and these beliefs showed different relationships with boredom. While affectively disliking boredom is related to the tendency to feel bored, recognizing its functions and normalizing its experience may not be.

4.5.1 Future Directions

Overall, the Boredom Beliefs Scale is potentially useful for theoretical and applied purposes. Theoretically, it can be adopted to investigate the impact of boredom beliefs on experiential and behavioural outcomes of boredom. Boredom has been linked with a wide range of behaviours, both adaptive (e.g., prosocial behaviours, exploration, Bench & Lench, 2019; Van Tilburg & Igou, 2017b) and maladaptive (e.g., unhealthy snacking, risk taking, Kılıç et al., 2020; Moynihan et al., 2015). Our qualitative findings offer some preliminary insights—participants who were afraid of being bored mentioned that they would shut out this feeling at all costs, whereas those who normalized this feeling allowed its presence. Are people who recognize boredom's values more likely to, say, stimulate their own creativity? Do people who dislike boredom become more reactant to its through ill means, such as aggression and addiction? Do normalizing boredom cause parents to allow their kids to be bored? Enriching the current literature, our research raises many interesting questions that can be examined using the developed scale.

The scale might also be adopted in clinical setting. Emotion beliefs are suspected to be good targets for clinical intervention given their malleability (Ford & Gross, 2019). In light of the substantial evidence on the association between boredom proneness and psychological health (Chapter 3), whether changing one's boredom beliefs may weaken this association is an important question for future investigation.

4.5.2 Limitations

The results, however, should be considered alongside a number of limitations. First, we conducted our interviews with university students in Hong Kong. As such, the qualitative findings and the items of BBS might not capture other possible lay boredom beliefs possessed by people at different developmental stages or with different educational or occupational backgrounds. Second, the

associations between the three subscales, and their associations with boredom proneness were not consistent across Hong Kong, American, and British samples. Also, our samples were comprised of participants with diverse demographic characteristics in terms of gender, age, education level, and occupation. Our current findings cannot ascertain whether the inconsistency in the findings was attributed to the reliability of the scale, difference in sample sizes, diverse demographic characteristics, or cultural difference. Future research with larger samples is needed to elucidate the relationships. Third, the test-retest interval (i.e., two weeks) was rather short. Future research should adopt longer test-retest intervals, or test longitudinal measurement invariance to examine the temporal stability of the scale.

4.6 Conclusion

What lay beliefs about boredom do people hold? Through qualitative and quantitative methods, we identified three boredom beliefs, whether one recognizes the functions of boredom (boredom functionality), dislikes boredom affectively (boredom dislike) and normalizes its experience (boredom normalcy). We developed and validated the Boredom Beliefs Scale as a valid and reliable instrument to assess these beliefs. The current research opens a new area of research that has both theoretical and applied significance.

Chapter 5
Examining the Relations between Boredom Belief, Experience, and Coping

5.1 Introduction

Boredom signals the needs for meaning and attentional reengagement. People respond to it in varying ways, yet some forms of coping are more detrimental than others. To name a few, bored people may kill worms (Pfattheicher et al., 2020), harm themselves (Nederkoorn et al., 2016), take risks (Kılıç et al., 2020), or indulge in their electronic devices (Elhai et al., 2018). What steers them away from healthy outlets of their emotion to harmful or even sadistic behaviours? Emerging research on emotion beliefs offers some hints—whether people value or accept their emotions influences their emotion regulation (Ford & Gross, 2018, 2019). How people evaluate boredom might play a key role in how they approach boredom. As the previous chapter revealed that some people affectively dislike boredom, do they experience and cope with boredom differently? This question is the focus of the present chapter.

5.1.1 Boredom and Coping

Boredom is an emotion that comes and goes (Fisher, 1993). The experience of it is rather unpleasant (Smith & Ellsworth, 1985; Van Tilburg & Igou, 2017a), featured by a void of meaning (e.g., Chan et al., 2018; Van Tilburg & Igou, 2012), a distracted mind (A. Hunter & Eastwood, 2016; Yakobi et al., 2021), and a distorted time perception (Martin et al., 2006; Witowska et al., 2020). Worse still, as discussed in Chapter 2, if bored people fail to attain adequate attentional engagement for some time, they go through a feedback loop of attention shifts with intensified levels of boredom and other negative emotions. The detrimental mental health impact of prolonged boredom is evident, as reviewed in Chapters 2 and 3. The aversive experience of boredom, however, serves several important functions. It informs people that the current situation lacks meaning, and motivates a redirection of attention to something more satisfying (Bench & Lench, 2013; Elpidorou, 2014; Van Tilburg & Igou, 2012). Its associations with a wealth of cognitive and behavioural outcomes suggest it to be a powerful instigator for changes.

To cope with boredom, people may adopt different strategies. 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 cognitive-approach strategies, people may mitigate boredom through 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 (Danckert, Hammerschmidt, et al., 2018), 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 goes on. 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, 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., 2020). Ineffective coping strategies might prolong the experience of boredom. Chronic boredom is associated with risky driving (Oxtoby et al., 2019), binge drinking (Biolcati et al., 2016), emotional eating (Crockett et al., 2015), problematic internet use (Skues et al., 2016), and excessive smartphone use (Al-Saggaf et al., 2019; Elhai et al., 2018; Ksinan et al., 2019; Wolniewicz et al., 2020).

Among the four orientations of coping strategies, cognitive approach seems to be the best coping method in academic settings. Students who tended to adopt this approach were bored less frequently and reported more positive motivational, emotional, and cognitive outcomes (Nett et al., 2010). Moreover,

only this approach was positively associated with the desire to obtain new knowledge (Eren & Coskun, 2016). On the contrary, behavioural avoidance was not associated with less frequent occurrence of boredom (Eren & Coskun, 2016; Nett et al., 2011) and hence might not be an effective boredom coping strategy. Students who tended to adopt this approach showed worse academic profile with poorer motivational, emotional, and cognitive outcomes (Nett et al., 2010).

5.1.2 Emotion Beliefs

What affects people's choice of coping strategies? As reviewed in the previous chapter, accumulating evidence sheds light on the role of emotion beliefs. People evaluate whether an emotion is good or bad, controllable or uncontrollable, useful or useless, helpful or harmful (Ford & Gross, 2018). These beliefs exert a pervasive influence on affective experience (Ford & Gross, 2019). For instance, a positive association was found between disliking of emotion and trait level of the emotion (Harmon-Jones et al., 2011). Encouraging participants to accept emotions led them to display less negative affects after watching a emotion-provoking video (Campbell-Sills et al., 2006; Predatu et al., 2020a).

Beliefs about emotion also have strong impacts on emotion regulation process. 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, to select strategies that help them avoid that emotion, and to experience negative meta-emotions. This theory is corroborated by subsequent empirical findings. In an experience-sampling study (Wittkamp et al., 2022), evaluating an emotion as harmful was associated with higher likelihood to engage in regulatory efforts, irrespective of the momentary affects. Moreover, people who endorse a theory that emotion helps are more likely to use cognitive reappraisal while those who endorse a theory that emotion hinders are more likely to suppress their emotions (Karnaze & Levine, 2018). Participants who held negative evaluations of sadness or disgust were more likely to avoid sad or disgusting stimuli (Markovitch et al., 2017). Likewise, 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). In an experiment where participants watched an emotion-provoking film, those who were instructed to endorse irrational emotion

beliefs like catastrophizing and evaluating emotion as unbearable reported more negative meta-emotions (Predatu et al., 2020a).

5.1.3 Current Research

Extensive evidence points to the linkage between boredom and problematic behaviours. These behaviours, however, are not necessarily caused by boredom; they are manifestations of how people choose to cope with the emotion. As discussed in Chapter 2, while many factors like situational constraints and personal preference affect boredom experience and behaviours, what might be a stable but malleable factor that consistently shapes boredom experience and coping across diverse settings? Drawing from research on emotion beliefs reviewed above, we propose people's lay beliefs about boredom to be one such factor.

The current research aimed to examine how boredom belief affects the way boredom is experienced and coped with. In the previous chapter, we found that people hold varying lay beliefs about boredom, whether they recognize the functions of boredom (*boredom functionality*), hate feeling bored (*boredom dislike*), and normalize boredom experience (*boredom normalcy*). In the present chapter, we selected boredom dislike as the target of investigation, considering that it is the belief that most resembles the negative evaluation of emotion in the literature (Ford, Lam, et al., 2018; Luong et al., 2016), and the findings from Chapter 4 that boredom dislike was consistently associated with boredom. We tested two main hypotheses:

Hypothesis 1 was that boredom dislike is positively associated with frequency (H1a) and intensity (H1b) of boredom. According to Ford and Gross (2018), those who believe a certain emotion is bad may more readily notice the signs of that emotion, and thus evaluate the current emotion and situation more negatively.

Hypothesis 2 was that boredom dislike moderates the associations of boredom frequency (H2a) and intensity (H2b) with smartphone use. We argue that people who dislike boredom strongly are more likely to use smartphones to avoid their feelings when bored. 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) that people are more likely to avoid an emotion they believe is undesirable.

We examined smartphone use as an avoidance coping strategy of boredom. 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). Our pilot study provides experimental evidence that participants indeed used their smartphones more often and longer when they were subjected to a boring situation (Tam, 2017). While boredom sparks inspirations (Mann & Cadman, 2014) and motivates people to search for meaning (Van Tilburg & Igou, 2017b), many choose to fiddle with their smartphones despite evidence on the adverse effects of excessive smartphone use (Sohn et al., 2019; Yang et al., 2020). Smartphone serves as a portable, convenient tool for boredom coping. People could avoid boredom anywhere, anytime, through their smartphones. Examining whether boredom dislike moderates the association between boredom and smartphone use therefore has practical implications.

In two studies, we tested our hypotheses at both between-person (Study 1) and within-person (Study 2) levels. Study 1 was a correlational study with an American sample that tested the between-person associations (i.e., individual differences) of boredom dislike, boredom experience, and excessive smartphone use. Study 2 was a three-wave longitudinal study (four months apart) with a Hong Kong sample, in which we examined the within-person associations (i.e., how one occasion differs from another) of boredom dislike, boredom experience, and smartphone screen time.

5.2 Study 1

Study 1 was a correlational study that served as an initial test of our hypotheses: (1) boredom dislike is positively associated with boredom experience (as boredom frequency and intensity; H1a & H1b), and (2) 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 psychological well-being (e.g., Elhai et al., 2017; Samaha & Hawi, 2016).

5.2.1 Method

Participants

We recruited Amazon's Mechanical Turk (MTurk) workers who (i) were residing in the US and (ii) 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).

Procedure and Measures

Participants completed an online survey with measures of boredom dislike, boredom frequency, boredom intensity, and excessive smartphone use. Boredom dislike is a subscale of the Boredom Beliefs Scale (BBS; Chapter 4) which assesses the extent to which people affectively dislike boredom (e.g., "I hate being bored": 1 = *strongly disagree*, 7 = *strongly agree*; α = .70). Two items (Chapter 3) 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*). Problematic 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 (α = .95).

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 centered. We used simple slopes analysis to probe significant interaction(s).

5.2.2 Results

Descriptive statistics and correlations of the measured variables are presented in Table 5.1. Supporting Hypothesis 1, boredom dislike was positively associated with boredom frequency (H1a) and intensity (H1b).

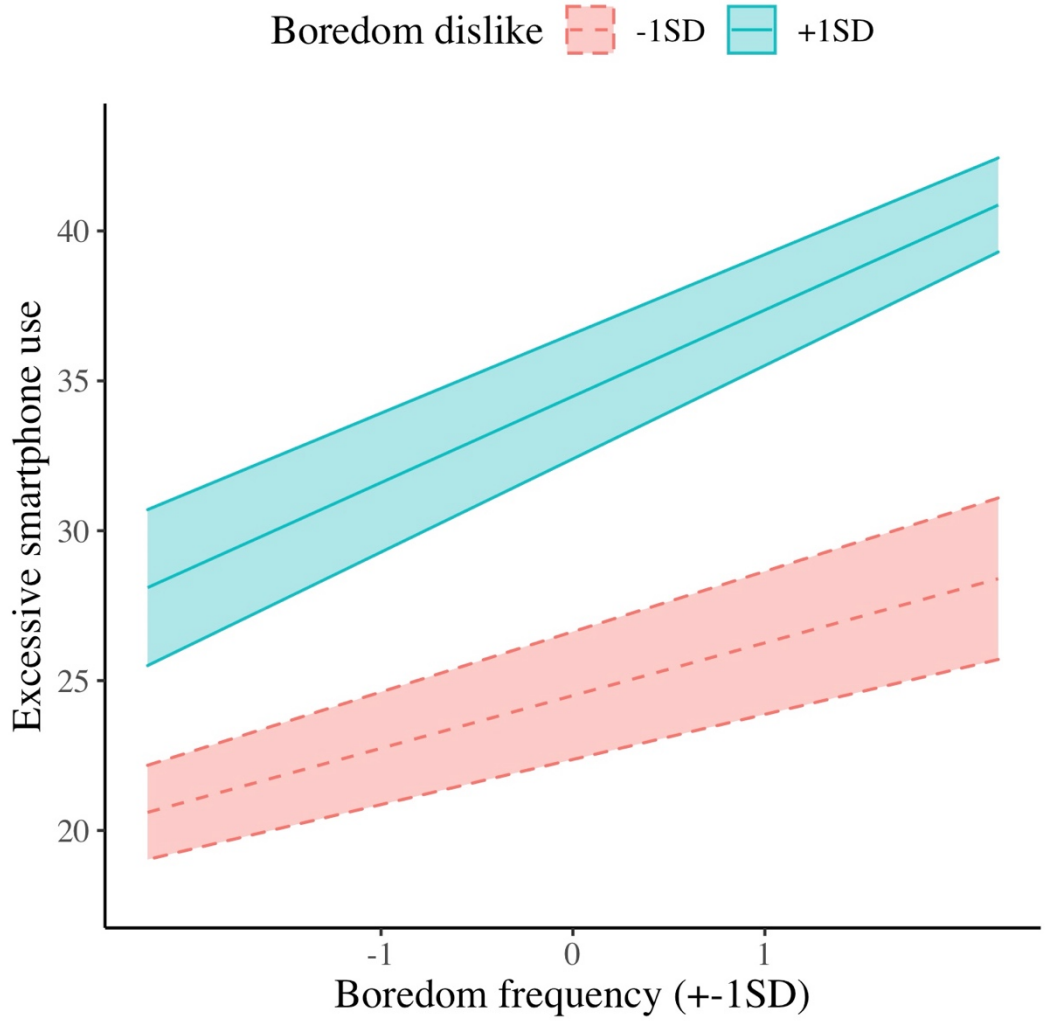
Table 5.1
Means, Standard Deviations, and Correlations of the Measured Variables in Studies 1 and 2

	M	*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. Smartphone addiction	30.11	14.10	.53***	.54***	.56***
Study 2 (*N* = 261)					
1. Boredom dislike	4.10	1.24	-		
2. Boredom frequency	5.50	1.65	.45***	-	
3. Boredom intensity	4.72	1.65	.46***	.67***	-
4. Screen time	353.53	154.53	-.10	.04	-.05

Note. Means, standard deviations, and correlations for Study 2 are those of aggregated mean scores of participants.
*** $p < .001$.

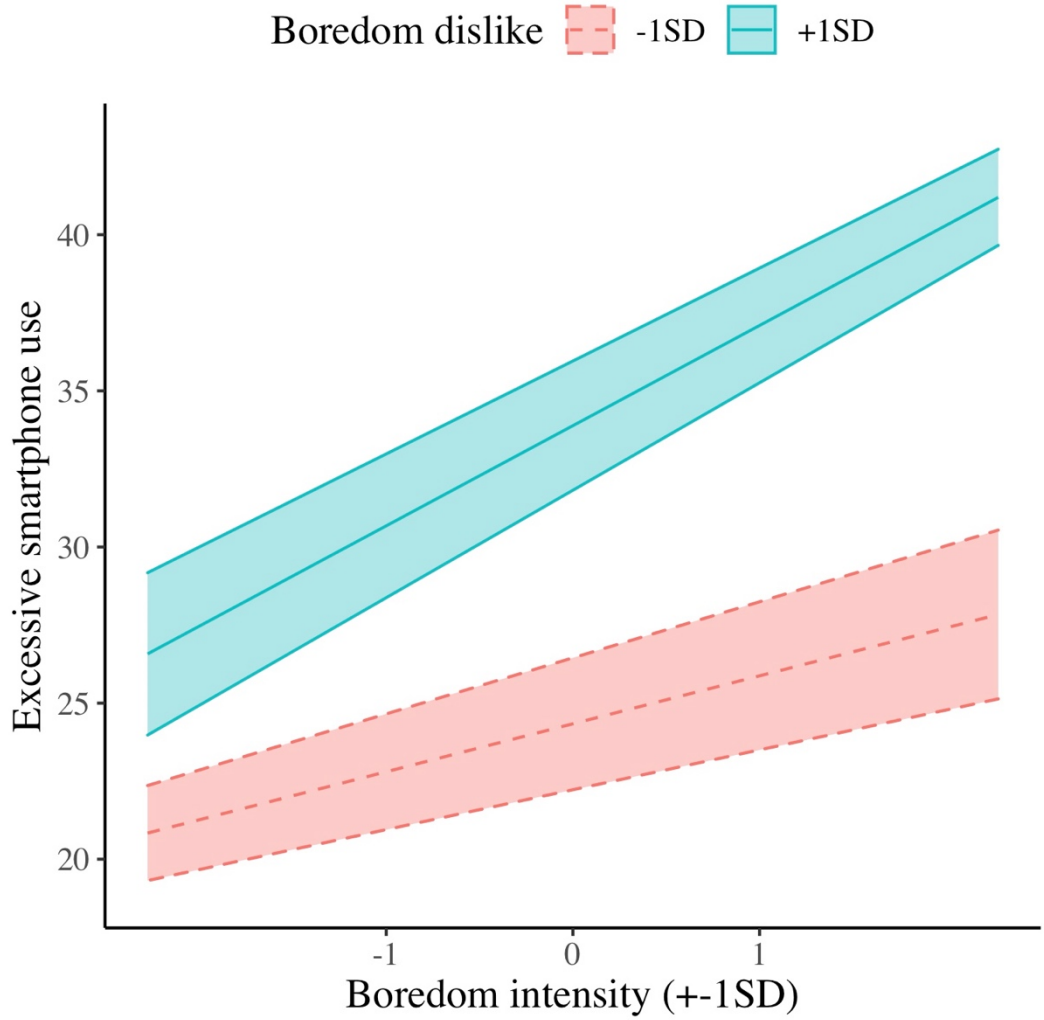
In a regression model with boredom frequency (H2a), excessive smartphone use was positively associated with boredom dislike (β = .354, SE = .394, $p < .001$), boredom frequency (β = .365, SE = .258, $p < .001$), and their interaction term (β = .085, SE = .160, $p = .016$). A simple slopes analysis revealed that boredom frequency was significantly associated with excessive smartphone use in both high (+1 SD above the mean) level of boredom dislike, $B = 2.88$, $SE = .340$, $p < .001$, and low (-1 SD below the mean) level of boredom dislike, $B = 1.76$, $SE = .354$, $p < .001$ (Figure 5.1; H2a). These two slopes were significantly different, $B = -1.12$, $SE = .463$, $p = .016$.

Figure 5.1
Simple Slopes for Between-person Associations of Boredom Dislike and Boredom Frequency in the Prediction of Excessive Smartphone Use in Study 1



In a regression model with boredom intensity (H2b), excessive smartphone use was also positively associated with boredom dislike (β = .339, SE = .395, p < .001), boredom intensity (β = .384, SE = .252, p < .001) and their interaction term (β = - .133, SE = .151, 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 = .329, p < .001, and in low (-1 SD below the mean) level of boredom dislike, B = 1.54, SE = .339, p < .001 (Figure 5.2; H2b). These two slopes were significantly different, B = -1.67, SE = .438, p = .001.

Figure 5.2
Simple Slopes for Between-person Associations of Boredom Dislike and Boredom Intensity in the Prediction of Excessive Smartphone Use in Study 1



5.2.3 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) and intensity (H1b). Also, those who felt bored more often and more intensely tended to report excessive smartphone use; these associations were stronger among those strongly disliked boredom (H2a & H2b). Despite the promising findings, Study 1 used a self-report measure of smartphone addiction, 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.

5.3 Study 2

Study 2 sought to extend the results from Study 1 in several ways. This study 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, we collected objective smartphone data—the amount of screen time recorded on iPhones—in Study 2. Evaluating our hypotheses with different assessment of smartphone behaviour at within-person level contribute to the generalizability of our findings.

5.3.1 Method

Participants

We recruited participants from the University of Hong Kong 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 users or unwilling to report their smartphone data (n = 246 at T1, n = 144 at T2, n = 100 at T3)[8], 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

[8] There was no significant difference in boredom dislike, boredom frequency, or boredom intensity between data points with and without screen time data (see Appendix B).

participants at T1 (77.4% female; age range = [17, 62], *M* = 22.5, *SD* = 6.17), 132 participants at T2, and 98 participants at T3.

Procedure and Measures

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 information on your objective smartphone usage data through the 'Screen Time' function on iPhone.[9] 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."

Data Analysis

Using *lme4* and *lmerTest* packages in *R*, we conducted multilevel modelling analysis to account for the nest data structure with 460 data points (Level 1) within 261 respondents (Level 2). For Hypothesis 1, we tested multilevel models with boredom frequency (or boredom intensity) as the outcome 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), was 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 group-mean centered. This procedure provided estimates of within-person variations of these predictors from time point to another.

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[9] Due to the absence of built-in function in Androids to record smartphone usage, we were only able to obtain objective screen time data from iPhone users.

5.3.2 Results

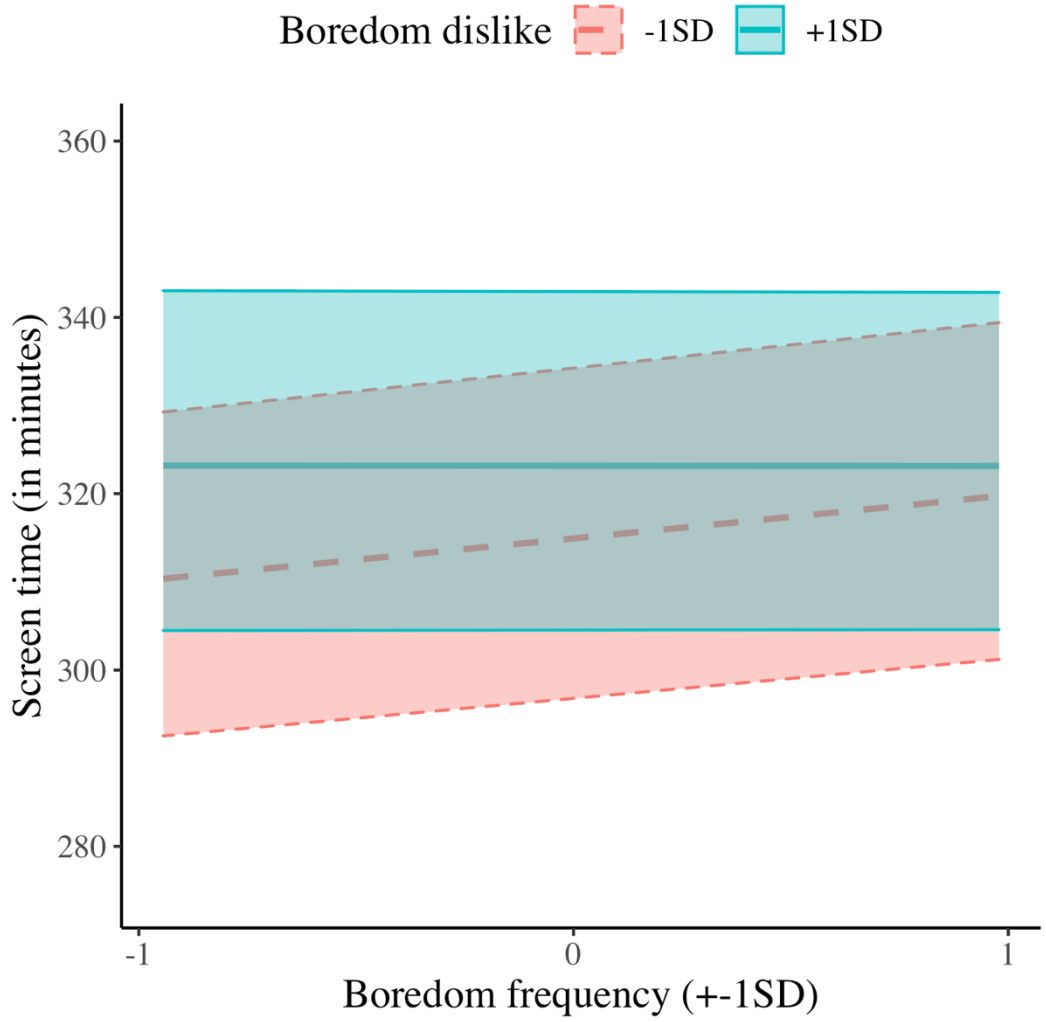
Descriptive statistics and correlations of the measured variables are presented in Table 5.1. The intra-class correlations (ICCs) were .55 for boredom dislike, .50 for boredom frequency, .48 for boredom intensity, and .60 for smartphone use.

Supporting Hypothesis 1, in random-intercept regression models, boredom dislike showed positive associations with boredom frequency, $B = 0.434$, $SE = .096$, $p < .001$ (H1a), and boredom intensity, $B = 0.425$, $SE = .094$, $p < .001$ (H1b).

To test Hypothesis 2, a random-intercept Poisson regression model was estimated with screen time as the dependent variable (H2a). Screen time was positively associated with 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 5.3; 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 positively associated with boredom dislike ($B = 0.018$, $SE = .004$, $p < .001$), boredom intensity ($B = 0.012$, $SE = .003$, $p < .001$), but not with their interaction term ($B = 0.001$, $SE = .004$, $p = .789$).

Figure 5.3
Simple Slopes for Within-person Associations of Boredom Dislike and Boredom Frequency in the Prediction of Smartphone Screen Time in Study 2



5.3.3 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. Participants reported a higher level of boredom dislike at times they felt bored more frequently (H1a) and intensely (H1b). Findings regarding Hypothesis 2 appear less consistent with Study 1, which might be attributed to the differences in smartphone use measures. The positive association between boredom frequency and smartphone use was only significant 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 showed positive main effects on smartphone screen time, indicating that participants reported longer screen time when they had stronger boredom dislike. How do we interpret these findings? As discussed in Chapter 2, one of the implications of Boredom Feedback Model is that people's avoidance strategy, such as using smartphone, that successfully reduces boredom is reinforced. Over time, people may learn to pull out their smartphones to avoid the potential 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 times participants disliked boredom more strongly, they engaged in more smartphone behaviours to reduce the possibility of feeling bored, irrespective of their actual experience of boredom. This aligns with the qualitative findings from Chapter 4 that some participants who held negative evaluations of boredom would avoid feeling bored at all costs.

5.4 General Discussion

A desperate desire to escape is a signature of boredom (Smith & Ellsworth, 1985). Whether people escape through healthy (Mann & Cadman, 2014; Van Tilburg & Igou, 2017b) or unhealthy (Havermans et al., 2015; Pfattheicher et al., 2020) means is a matter of choice. What steers bored people away from meaningful pursuits to staring at their screens? In correlational and longitudinal studies, we examined the moderating role of boredom dislike in the relationship between boredom experience and smartphone use. At both between-person (Study 1) and within-person (Study 2) levels, disliking boredom was positively associated with the frequency (H1a) and intensity (H1b) of boredom. Moreover, boredom dislike moderated the associations of boredom frequency (Studies 1 & 2; H2a) and intensity (Study 1; H2b) with smartphone use, indicated in both results with self-report (Study 1) and objective measures (Study 2). Taken together, our results provide compelling evidence to support that disliking boredom promotes an experiential avoidance of boredom through 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 experience. This is consistent with the results from Chapter 4 on the positive association between boredom dislike and boredom, as well as the findings that disliking of withdrawal-oriented emotions like fear and disgust were 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 disliking of boredom because they expose 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 unpack the casual relationship between boredom dislike and boredom experience.

We also found support for Hypothesis 2. Boredom frequency and intensity positively predicted smartphone use, which parallels the findings on boredom proneness and smartphone addiction in previous studies (Elhai et al., 2018; Wolniewicz et al., 2020). Taking a step further, our findings revealed that boredom dislike interacted with boredom frequency (Studies 1 & 2; H2a) and intensity (Study 1; H2b) in predicting smartphone use. At between-person level, the positive associations of boredom frequency and intensity with excessive smartphone use were stronger among participants who displayed stronger boredom dislike than others. At within-person level, the positive association between boredom frequency and smartphone use was only significant in low level of boredom dislike; participants engaged in smartphone behaviours irrespective of their boredom frequency in high level of boredom dislike. Also, there was a main effect of boredom dislike on screen time, indicating that participants reported longer screen time when they disliked boredom more strongly. These are in line with previous empirical findings that 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 boredom.

5.4.1 Implications

The present research provides novel insights into the role of a boredom belief in boredom experience and behaviour. 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 might be 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., 2020) 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 variabilities within person in Study 2.

Given that boredom functions to signal a need for behavioural changes in search for meaning (e.g., Bench & Lench, 2013; Elpidorou, 2014; 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. This raises a possibility that smartphone use might not help relieve boredom, like Nett and colleagues (2010) suggest behavioural avoidance to be the least effective approach in coping with boredom. Additionally, excessive smartphone use is associated with lower life meaning (Çevik et al., 2020) and poorer mental health (Sohn et al., 2019; Yang et al., 2020). From our results, people use their smartphones more when they are bored, and if they dislike being bored.

5.4.2 Limitations

We note that the current research has several limitations. First, our results were correlational, and as such no casual 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 built-in function in Androids to record smartphone use. We did not find significant difference in boredom dislike, boredom frequency and boredom intensity between data points with and without screen time data (see Appendix B). 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 screen time they reported was the average of the last 7 days at each time point since the Screen Time app could not record and report average screen time over longer period at the time of data collection. Future studies are encouraged to measure these items with similar time scale.

5.5 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 showed that disliking boredom was associated with higher frequency and intensity of boredom. It interacted with boredom frequency and intensity in predicting smartphone use measured by self-report and objective means. The current research advances understanding of how boredom belief relates to the way boredom is experienced and coped with.

Chapter 6

Examining the Relations between Boredom Beliefs, Experience, and Well-being[10]

6.1 Introduction

Protracted boredom can lead to undesirable outcomes in young people, including lower life satisfaction (Spruyt et al., 2018), depressive feelings (Spaeth et al., 2015), deviant behaviour (Malizia, 2018), and risky behaviours such as binge drinking and internet addiction (Biolcati et al., 2018). Since young people are more prone to boredom (Caldwell et al., 1999; Weybright et al., 2020), they might be especially challenged by the constraints on autonomy and leisure in the coronavirus disease 2019 (COVID-19) pandemic. Identifying those who are particularly at risk may help mitigate the adverse impact of boredom on well-being and enhance preparedness for similar high-risk situations in the future. The evidence on the deleterious mental health effects of chronic boredom (Chapter 3), the findings that people vary in their lay beliefs about boredom (Chapter 4), coupled with the implications of these beliefs on the way boredom is experienced and coped with (Chapter 5), raise an important question—how boredom beliefs shape the relationship between boredom and mental well-being? The present chapter sought to address this question.

6.1.1 Boredom and Mental Well-being

Boredom can be defined as an aversive state of wanting to, but being unable to, engage in a satisfying activity (Eastwood et al., 2012). People's cognitive abilities in attentional engagement, perceived constraints, and abilities to identify satisfying activities are central to the experience of boredom. These components might be the reasons why young people are argued to be especially prone to boredom (Caldwell et al., 1999; Weybright et al., 2020), given that they

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[10] This chapter is based on an article in press:

Tam, K. Y. Y., Chan, C. S., Van Tilburg, W. A. P., Lavi, I., & Lau, J. Y. F. (in press). 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.* https://doi.org/10.1111/jopy.12764

are undergoing maturational changes in relevant cognitive (Luna et al., 2004) and emotional abilities (Yurgelun-Todd, 2007), with an increased desire for autonomy (Daddis, 2011) but inadequate skills to structure their free time (Caldwell et al., 1999), to exert self-control (Casey & Caudle, 2013), and to cope with boredom (Spaeth et al., 2015; Weybright et al., 2020). Indeed, boredom is a common experience among youth (Chin et al., 2017; Larson & Richards, 1991; Spaeth et al., 2015).

While boredom comes and goes, chronically experiencing it can potentially be detrimental to one's well-being, as reviewed in Chapter 3. For young people in particular, diminished self-control at this developmental stage (Casey & Caudle, 2013), coupled with an interlocking relationship between boredom and self-control (Bieleke et al., 2021; Wolff et al., 2020; Wolff & Martarelli, 2020), underscore potentially heightened risk among them to respond to boredom with impulsive, risky behaviours, which might, in turn, be detrimental to their well-being. Indeed, boredom proneness is found to be associated with deviant (Malizia, 2018) and problematic behaviours (Biolcati et al., 2018), lower life satisfaction (Spruyt et al., 2018), and depressive feelings (Spaeth et al., 2015) among young people.

Considering the developmental changes across adolescence and young adulthood, boredom may be particularly challenging for them under the constraints on autonomy and leisure activities during the pandemic. Studies on boredom and COVID-19, however, predominantly focus on adult population (e.g., Boylan et al., 2021; Wolff et al., 2020). These studies consistently suggest boredom to be a prominent negative experience in the pandemic. From 2019 to 2020, searches for boredom on Google had increased substantially in Europe and America, and this had not dissipated over time as lockdown went on (Brodeur et al., 2021). People reported a greater level of boredom during lockdown (Droit-Volet et al., 2020; Latif & Karaman, 2021), and boredom was shown to be associated with various negative psychological outcomes, such as fear of COVID-19 (Caci et al., 2020), symptoms of depression, anxiety, stress (Chao et al., 2020), fear, neurasthenia, and hypochondria (Yan et al., 2021). It was also ranked as the top reason for smoking more and using more cannabis after the outbreak of COVID-19 (Vanderbruggen et al., 2020). People who had a high tendency to experience boredom (i.e., high in boredom proneness) perceived social distancing

(Wolff et al., 2020) as more difficult, and they were less likely to adhere to rules of social isolation (Boylan et al., 2021; Wolff et al., 2020). Boredom proneness was found to mediate the association between perceived stress to the COVID-19 pandemic and emotional distress (Yan et al., 2021). There is a paucity of data on boredom in young people during the COVID-19 pandemic; the only study that has examined youth boredom focuses on the educational context (Martarelli et al., 2021). It is important to investigate factors that might help mitigate the mental health impact of boredom for young people, especially during high-risk situations such as the pandemic.

6.1.2 Boredom Beliefs

Emerging research demonstrates that emotion beliefs can attenuate the association between emotional experience and psychological health (e.g., Ford, Lam, et al., 2018; Ford & Gross, 2018, 2019; Luong et al., 2016; Yoon et al., 2018). It is theorized that people who believe a particular emotion is bad more readily notice the signs of that emotion and perceive it as unpleasant, which in turn alters their emotional experience (Ford & Gross, 2018). Emotion beliefs may attenuate the emotion-health link through altering emotional experience, the accompanying distress, and each stage of emotional regulation, such as identification of the need for regulation and selection of regulation strategies (Ford & Gross, 2019; Luong et al., 2016). These theoretical propositions are corroborated by empirical findings. For example, "liking" withdrawal emotions, such as fear and disgust, was found to be associated with less intense experience of these emotions (Harmon-Jones et al., 2011). Valuing negative affects reduces their detrimental impact on health (Luong et al., 2016). On the contrary, negative attitudes towards emotion have a medium-to-large relation with higher depressive symptoms (Yoon et al., 2018).

Since people have distinct beliefs about different emotions (Chapter 4), people's *lay beliefs about boredom* might similarly influence boredom experience and its deleterious effect on mental well-being. In the previous chapters, we identified three key boredom beliefs—*boredom functionality*, *boredom dislike*, and *boredom normalcy*, and found a positive association between boredom dislike and boredom experience. Yet, neither the relationship of boredom beliefs with

mental health nor the implication of boredom beliefs among adolescents has thus far been examined.

6.1.3 Current Research

The current research investigated individual differences in young people's boredom beliefs, boredom experience, and mental well-being using correlational (Study 1) and multi-wave longitudinal (Study 2) data. It sought to replicate and extend the findings from the previous chapters to mental health setting and to a younger population. Study 1 served as an initial test of the variables with a large sample of young people aged 12–25 in the UK. Additionally, we aimed to further validate the Boredom Beliefs Scale (BBS; Chapter 4) among this population. Study 2 was an eight-wave within-subject study that examined these associations collapsed across 16 weeks in a sample of adolescents aged 12–18 in Israel. We targeted two facets of boredom beliefs, boredom dislike and boredom normalcy, and examined boredom experience in terms of its frequency and intensity. Across the two studies, we tested two hypotheses: (1) disliking boredom is positively associated with frequency (H1a) and intensity (H1b) of boredom; and (2) the association of boredom frequency (H2a) and intensity (H2b) with mental well-being is stronger among those reported higher levels of boredom dislike. We did not formulate a hypothesis regarding boredom normalcy since there is limited research on the effect of normalizing emotions. The analyses for boredom normalcy were thus exploratory.

6.2 Study 1

The purpose of Study 1 was two-fold. First, we investigated the association between boredom beliefs and boredom experience, as well as the role of boredom beliefs in attenuating the link between boredom experience and mental well-being. Second, we examined the psychometric properties of the BBS in an adolescent sample.

6.2.1 Method

Participants and Procedure

Data from this study was derived from a larger research project on emotional impact of the global COVID-19 pandemic among adolescents and young adults. The study was approved by the Psychiatry, Nursing and Midwifery Research Ethics Committee at Kings College London (ref: HR-19/20-18868).

Anyone aged between 12 and 25 residing in the UK at the time of data collection (from 12th May to 2nd December 2020) was eligible to take part. Participants were recruited via several methods: advertising within UK schools, colleges, and universities, research advertisement websites, social media, and charities. All participants aged 16 or over provided informed consent. For participants under 16, informed assent/consent was provided by participants and their parent/guardian respectively. Participants were offered vouchers for their time spent taking part in this and subsequent follow-up surveys. A total of 4,872 respondents clicked on the survey link. Excluding those who (1) did not report anything other than initial demographic information (n = 1,932), (2) were duplicate responses (n = 33), (3) did not meet age criteria (n = 13), (4) completed the survey in less than 5 minutes (n = 41; median completion time was 18 minutes), (5) were not in the UK (n = 48), (6) showed other evidence of inauthentic responding, such as irrelevant responses to qualitative questions (n = 245, identified by 3 independent coders), or (7) had missing data on key variables for this analysis (n = 65), the final sample contained 2,495 young people (70.2% female; age range = [12, 25], M = 17.9, SD = 3.58).

Measures

We administered two subscales of the BBS. Boredom dislike subscale is a 3-item measure assessing the extent to which participants affectively dislike boredom (e.g., "I hate being bored"; 1 = *strongly disagree*, 7 = *strongly agree*; α = .74), while boredom normalcy subscale is a 3-item measure assessing the extent to which participants normalize the experience of boredom (e.g., "It is okay to feel bored."; 1 = *strongly disagree*, 7 = *strongly agree*; α = .59).

Two items were used to measure frequency ("How often have you felt bored in the last two weeks?": 1 = *none of the time*, 9 = *all of the time*) and intensity ("When you feel bored, what is your experience of it like?": 1 = *very mild*, 9 = *very intense*) of boredom (Chapter 3).

Mental well-being was measured with the 7-item Short Warwick-Edinburgh Mental Well-being Scale (Stewart-Brown et al., 2011). The scale focuses on positive aspects of mental health and it was validated in adolescent samples (McKay & Andretta, 2017; Ringdal et al., 2018). Participants reported what best describes their experiences over the last two weeks (e.g., "I've been feeling optimistic about the future"). Ratings were made on a 5-point scale (1 =

none of the time; 5 = *all of the time*), with higher total scores indicating more positive mental well-being (α = .79).

Data Analysis

We examined the psychometric properties of the two boredom beliefs subscales, including their internal consistencies, factor structure, psychometric distinction from boredom experience, and measurement invariance across adolescents and young adults. To test Hypothesis 1, we examined the zero-order correlation between boredom dislike and boredom experience. To test Hypothesis 2, we conducted regression analyses to examine whether mental well-being was predicted by boredom dislike, boredom frequency (or boredom intensity) and their interaction terms. Simple slopes analysis was used to probe significant interactions. We also tested boredom normalcy as an exploratory predictor.

6.2.2 Results

Means, standard deviations and correlations of the measured variables are presented in Table 6.1.

Table 6.1
Means, Standard Deviations, and Correlations of the Measured Variables in Studies 1 and 2

	M	SD	1	2	3	4
Study 1						
1. Boredom frequency	5.60	2.07				
2. Boredom intensity	5.10	2.03	.59***			
3. Boredom dislike	4.38	1.45	.33***	.45***		
4. Boredom normalcy	4.87	1.20	-.01	-.03	-.13***	
5. Mental well-being	21.81	4.52	-.36***	-.34***	-.20***	.09***
Study 2						
1. Boredom frequency	4.69	2.37				
2. Boredom intensity	4.74	2.26	.37***			
3. Boredom dislike	4.16	1.63	.32***	.33***		
4. Boredom normalcy	4.56	1.61	.10***	.08**	.03	
5. Mental well-being	25.47	7.08	-.23***	-.13***	-.11***	.05

Note. ** $p < .01$ *** $p < .001$.

Psychometric Properties of Boredom Dislike and Boredom Normalcy Subscales

A Confirmatory Factor Analysis (CFA) with robust maximum likelihood estimator revealed that the two-factor model on the six items demonstrated fair model fit, Robust $\chi^2(8) = 171.258$, $p < .001$; Robust CFI = .936; Robust TLI = .880; Robust RMSEA = .096, 90% *CI* [.084, .109]; SRMR = .058. Standardized

factor loadings ranged from .55 to .81 for boredom dislike, and .29 to .96 for boredom normalcy. All the items loaded significantly ($p < .001$) on the respective factors. Boredom beliefs, boredom frequency, and boredom intensity were demonstrated to be distinct factors in CFAs. Further, we found full configural, full metric, and partial scalar invariance, between adolescent group (below the age of 18; $n = 1229$) and an adult group (at or above the age of 18; $n = 1266$). The internal consistency of boredom dislike subscale was good ($\alpha = .74$), whereas that of boredom normalcy subscale was fair ($\alpha = .59$). Detail results are included in Appendix C.

Relationship between Boredom Beliefs, Boredom Experience, and Mental Well-being

Boredom Dislike. Supporting Hypothesis 1, boredom dislike was positively correlated with frequency (H1a) and intensity (H1b) of boredom (Table 6.1). It was also negatively correlated with mental well-being.

Regarding Hypothesis 2, results of all the regression analyses are presented in Table 6.2. Mental well-being was significantly associated with boredom frequency, boredom dislike, and their interaction term (H2a). Simple slopes analysis revealed that the relationship between boredom frequency and mental well-being was significantly negative in both high (+1 SD) and low (-1 SD) levels of boredom dislike, $B = -0.88$, $SE = .058$, $t(2491) = -15.1$, $p < .001$, and $B = -0.56$, $SE = .055$, $t(2491) = -10.0$, $p < .001$ (Figure 6.1). These two slopes were significantly different, $B = 0.32$, $SE = .075$, $t(2491) = 4.29$, $p < .001$. A stronger association between boredom frequency and mental well-being was found among participants who disliked boredom more. Also, we found significant main effects of boredom intensity and boredom dislike on mental well-being, with a non-significant boredom intensity by boredom dislike interaction (H2b).

Boredom Normalcy. Zero-order correlations are presented in Table 6.1. Boredom normalcy was positively associated with mental well-being, but it was not associated with boredom frequency or intensity. As shown in Table 6.2, regression analyses with mental well-being as the outcome variable revealed a negative main effect of boredom frequency (or boredom intensity) and a positive main effect of boredom normalcy. There was no significant interaction between boredom frequency (or boredom intensity) and boredom normalcy.

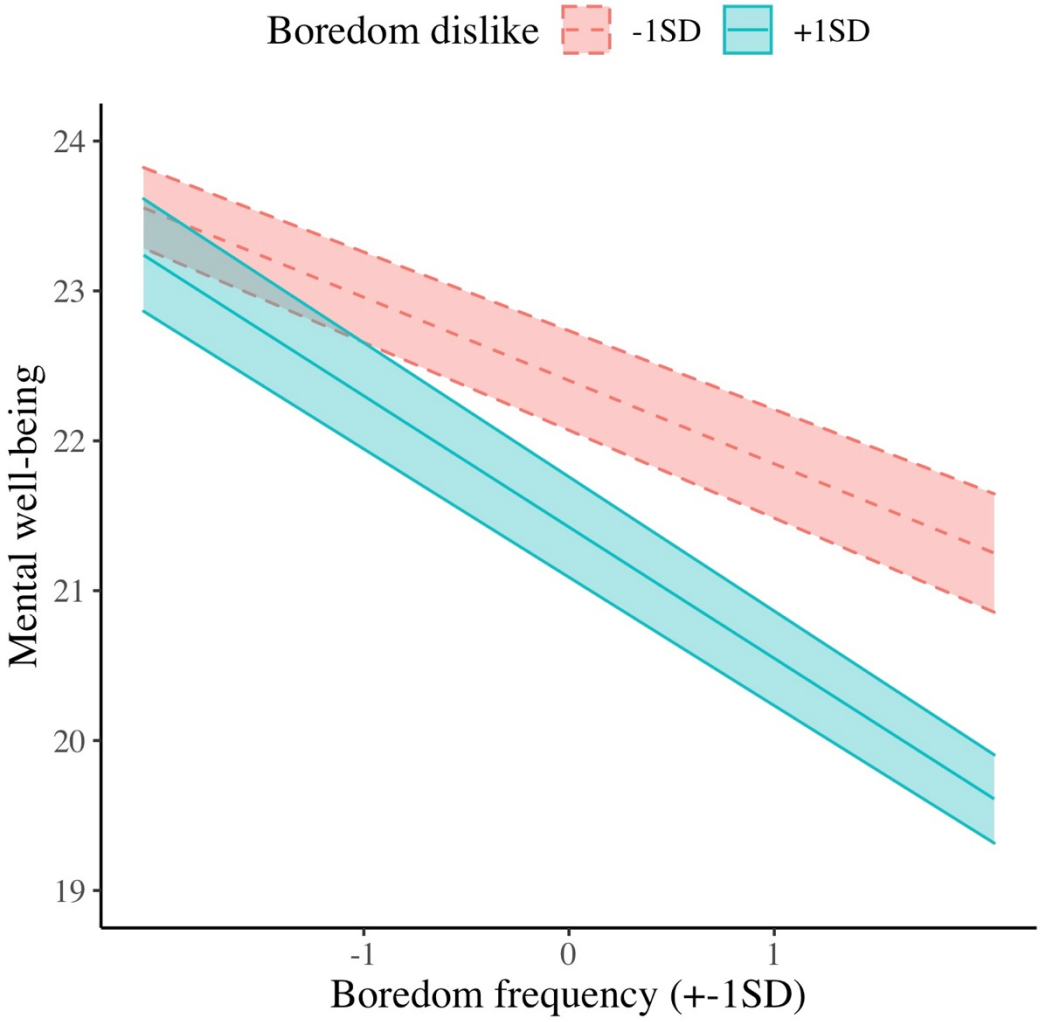
Table 6.2

Regression Models with Mental Well-being as Outcome Variable in Study 1

Predictor	*B*	*SE*	β	*p*
Model with boredom dislike and boredom frequency				
Intercept	21.913	0.088		
Boredom dislike	-0.337	0.062	-.108	< .001
Boredom frequency	-0.716	0.043	-.328	< .001
Boredom dislike × boredom frequency	-0.110	0.026	-.081	< .001
Adjusted R^2	.140			
Model with boredom dislike and boredom intensity				
Intercept	21.850	0.092		
Boredom dislike	-0.189	0.066	-.061	.004
Boredom intensity	-0.701	0.047	-.315	< .001
Boredom dislike × boredom intensity	-0.033	0.027	-.023	.217
Adjusted R^2	.119			
Model with boredom normalcy and boredom frequency				
Intercept	21.805	0.084		
Boredom normalcy	0.341	0.070	.091	< .001
Boredom frequency	-0.771	0.041	-.354	< .001
Boredom normalcy × boredom frequency	0.009	0.031	.005	.781
Adjusted R^2	.133			
Model with boredom normalcy and boredom intensity				
Intercept	21.807	0.085		
Boredom normalcy	0.323	0.071	.086	< .001
Boredom intensity	-0.753	0.042	-.339	< .001
Boredom normalcy × boredom intensity	0.017	0.032	.010	.594
Adjusted R^2	.123			

Note. All predictors were centered.

Figure 6.1
Simple Slopes for Between-person Associations of Boredom Dislike and Boredom Frequency in the Prediction of Mental Well-being in Study 1



6.2.3 Discussion

In a large sample of young people aged 12–25 in the UK during the COVID-19 pandemic, we found that participants who strongly disliked boredom tended to experience it more often (H1a) and more intensely (H1b). Furthermore, participants who often felt bored were more likely to report poorer mental well-being, but this association was weaker among those who reported a lower level of boredom dislike (H2a). The moderating effect was not observed in the association between boredom intensity and mental well-being (H2b). Moreover, participants who accepted and normalized the experience of boredom were more likely to report better mental well-being. The Boredom Beliefs Scale was demonstrated to be a measure with appropriate factorial validity, internal consistency, and measurement invariance across adolescents and young adults. These promising

findings are, however, limited by the study's correlational design. Although they inform us of the between-person variations in boredom beliefs (i.e., how a person differs from another in boredom beliefs), they neither speak to the malleability and stability of these beliefs, nor how within-person variations in these beliefs (i.e., how a person differs in his/her levels of boredom beliefs from one occasion to another) were associated with boredom experience and mental well-being. A better understanding of this relationship could be obtained through repeated measurements of these constructs across time and situations. As such, we conducted a second study with a multi-wave longitudinal design to test our hypotheses.

6.3 Study 2

Study 2 was a longitudinal study in which we assessed boredom beliefs, boredom experience, and mental well-being among Israeli adolescents eight times across 16 weeks. In Study 1, we examined how people differ from one another in these constructs (i.e., between-person variations); for example, we tested whether those who dislike boredom more strongly tend to feel bored more often and more intensely than others. In Study 2, we focused on how people encounter boredom from one occasion to another (i.e., within-person variations); for example, if one's momentary boredom dislike is higher than their usual level, is that period of time characterized by higher frequency and intensity of boredom? Examining these constructs at the within-person level helps delineate how the boredom-health link is affected by the fluctuations in boredom beliefs within an individual.

6.3.1 Method

Participants and Procedure

Data was derived from a larger project that sought to investigate adolescents' emotional well-being under the COVID-19 pandemic in Israel. The study was approved by the Ethics Committee for Human Experiments at University of Haifa (ref: 368/20). Anyone aged between 12 and 18 residing in Israel at the time of data collection (from 14th May to 15th September 2020) was eligible to take part. Most participants were recruited via a survey company while some were recruited through word-of-mouth. They were invited to complete a baseline questionnaire and then fill out a follow-up survey once every two weeks for seven times. A total of 498 respondents clicked on the survey link. After

excluding those who had missing data on all key variables of the current analysis across all eight waves (n = 184), the final sample contained 314 adolescents (49.0% female; age range = [12, 18], M = 15.5, SD = 1.84), with a total of 1,401 data points.

Measures

We administered the same set of measures as in Study 1, namely, boredom dislike (α = .73), boredom normalcy (α = .75), boredom frequency, boredom intensity, and mental well-being (α = .88). Measures were administered in Hebrew, after all the scales were back-translated from English to Hebrew by two researchers who are proficient in both languages.

Data Analysis

We first attempted to replicate Study 1 results with the baseline data of Study 2. We then analysed the multi-wave longitudinal data. Multilevel modelling (MLM) was applied to account for the nested structure of the data with 1,401 data points (Level 1) within 314 participants (Level 2). Since all the variables were measured at Level 1, we performed group-mean centering on all the predictors to focus our analyses at the within-person level. This procedure partitions between-person variation (participants' scores relative to one another) in the dependent variables and the resultant Level-1 regressions represent only within-person associations (i.e., pertaining to participants' scores at each time point relative to their own [random] means). To test Hypothesis 1, we entered boredom frequency (or boredom intensity) as the dependent variable in a multilevel model with boredom dislike as a fixed predictor, and participant as a random intercept. To test Hypothesis 2, we entered mental well-being as the dependent variable in a multilevel model with boredom dislike, boredom frequency (or boredom intensity), and their interaction term as fixed predictors, and participant as a random intercept. Significant interactions were probed using simple slopes analyses. We conducted the same set of tests on boredom normalcy.

6.3.2 Results

Replicating Study 1's Results

Before we tested our hypotheses at within-person level, we checked whether the Study 1's results were replicated in the Study 2's baseline data (N = 293). It should, however, be noted that this sample size only afforded a power

of .80 to for detecting effects sized $r = .16$, assuming a Type-I error rate of 5% (two-sided), according to sensitivity analysis. Based on the effect size of the interaction ($\beta = -0.081$) in Study 1, a minimum sample size of 1,199, with power of .80, is needed to detect this effect with an alpha of .05.

We replicated (i) the two-factor model in CFA, (ii) correlations between boredom dislike, boredom frequency, and boredom intensity (Hypothesis 1), as well as (iii) regression models in which mental well-being was significantly positively associated with boredom normalcy. For Hypothesis 2, mental well-being was significantly associated with boredom frequency but not with boredom dislike and their interaction term. This was different from Study 1, which might be attributed to the differences in sample sizes (Study 1's $N = 2,495$ vs. Study 2's $N = 293$) and thus reduced power in detecting the interaction. Detail results are included in Appendix C.

Descriptives, Bivariate Correlations, and Intra-class Correlations

Next, we examined the within-person associations of boredom beliefs, boredom experience, and well-being in the multi-wave longitudinal data.

Means, standard deviations, and bivariate correlations of the measured variables are presented in Table 6.1. In the unconditional models, the intra-class correlations (ICCs) were .54 for boredom dislike, .52 for boredom normalcy, .44 for boredom frequency, .47 for boredom intensity, and .44 for mental well-being, respectively. These values suggest considerable variability existed at the between-person level.

Relationship between Boredom Beliefs, Boredom Experience and Mental Well-being

Boredom Dislike. For Hypothesis 1, boredom dislike (group-mean centered) was positively associated with boredom frequency, $B = 0.239$, $SE = .048$, $t(1095) = 4.94$, $p < .001$ (H1a), and boredom intensity, $B = 0.282$, $SE = .044$, $t(1111) = 6.41$, $p < .001$ (H1b). It was not associated with mental well-being, $B = 0.10$, $SE = .147$, $t(1107) = 0.686$, $p = .493$.

For Hypothesis 2, results of all the random-intercept multilevel-modelling analyses are reported in Table 6.3. Mental well-being was significantly associated with boredom frequency but not with boredom dislike. As in Study 1, the hypothesized boredom dislike × boredom frequency interaction was significant (H2a; Figure 6.2). Simple slopes analysis revealed that, in higher level (+1SD) of

boredom dislike, the relationship between boredom frequency and mental well-being was significant, B = -0.725, SE = .122, t(1170) = -5.925, p < .001. This relationship was not significant in lower level (-1SD), B = -0.212, SE = .116, t(1161) = -1.822, p = .069. These two slopes were significantly different, B = 0.512, SE = .155, t(1252) = 3.30, p = .001.

Moreover, when mental well-being was the outcome variable, the main effects of boredom dislike and boredom intensity were not significant. Unlike in Study 1, the hypothesized boredom dislike × boredom intensity interaction was significant (H2b; Figure 6.3). Simple slopes analysis revealed that, in higher level (+1SD) of boredom dislike, the relationship between boredom intensity and mental well-being was significant, B = -0.356, SE = .136, t(1157) = -2.628, p = .009. This relationship was not significant in lower level (-1SD), B = 0.045, SE = .128, t(1148) = 0.353, p = .724. These two slopes were significantly different, B = 0.401, SE = .171, t(1224) = 2.35, p = .019.

Boredom Normalcy. Boredom normalcy (group-mean centered) was not significantly associated with mental well-being, B = 0.085, SE = .145, t(1107) = 0.586, p = .558. It was positively associated with boredom frequency, B = 0.139, SE = .048, t(1096) = 2.87, p = .004, and boredom intensity, B = 0.111, SE = .044, t(1112) = 2.50, p = .013.

As shown in Table 6.3, multilevel analysis with mental well-being as the outcome variable revealed a significant main effect of boredom frequency, with a non-significant main effect of boredom normalcy and a non-significant boredom normalcy × boredom frequency interaction. Moreover, there was no significant main effect of boredom intensity, boredom normalcy, and their interaction on mental well-being.

Table 6.3

Random-intercept Models with Mental Well-being as Outcome Variable in Study 2

Predictor	*B*	*SE*	*p*	*95% CI*
Model with boredom dislike and boredom frequency				
Intercept	25.402	0.313		[24.787, 26.015]
Boredom dislike	0.152	0.147	.301	[-0.136 , 0.440]
Boredom frequency	-0.468	0.091	< .001	[-0.646 , -0.291]
Boredom dislike × boredom frequency	-0.264	0.080	< .001	[-0.421, -0.107]
Model with boredom dislike and boredom intensity				
Intercept	25.406	0.314		[24.788, 26.021]
Boredom dislike	0.150	0.149	.315	[-0.142, 0.441]
Boredom intensity	-0.156	0.100	.121	[-0.352 , 0.041]
Boredom dislike × boredom intensity	-0.207	0.088	.019	[-0.379 , -0.034]
Model with boredom normalcy and boredom frequency				
Intercept	25.351	0.313		[24.735, 25.964]
Boredom normalcy	0.154	0.145	.291	[-0.131, 0.439]
Boredom frequency	-0.441	0.090	< .001	[-0.618, -0.264]
Boredom normalcy × boredom frequency	0.033	0.081	.687	[-0.126, 0.191]
Model with boredom normalcy and boredom intensity				
Intercept	25.36	0.313		[24.742, 25.971]
Boredom normalcy	0.100	0.146	.494	[-0.186, 0.385]
Boredom intensity	-0.129	0.099	.193	[-0.323, 0.065]
Boredom normalcy × boredom intensity	-0.004	0.093	.963	[-0.187, 0.178]

Note. All predictors were group-mean centered.

Figure 6.2
Simple Slopes for Within-person Associations of Boredom Dislike and Boredom Frequency in the Prediction of Mental Well-being in Study 2

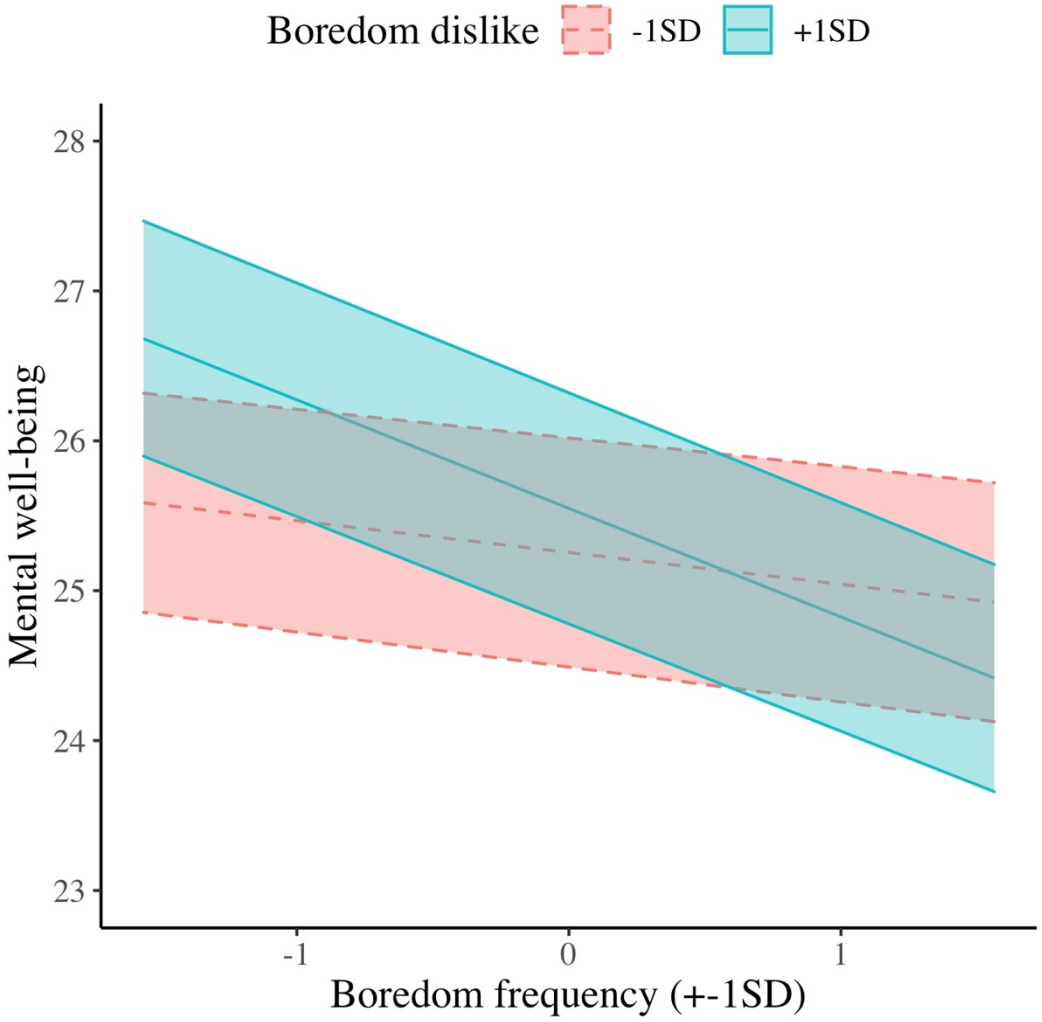
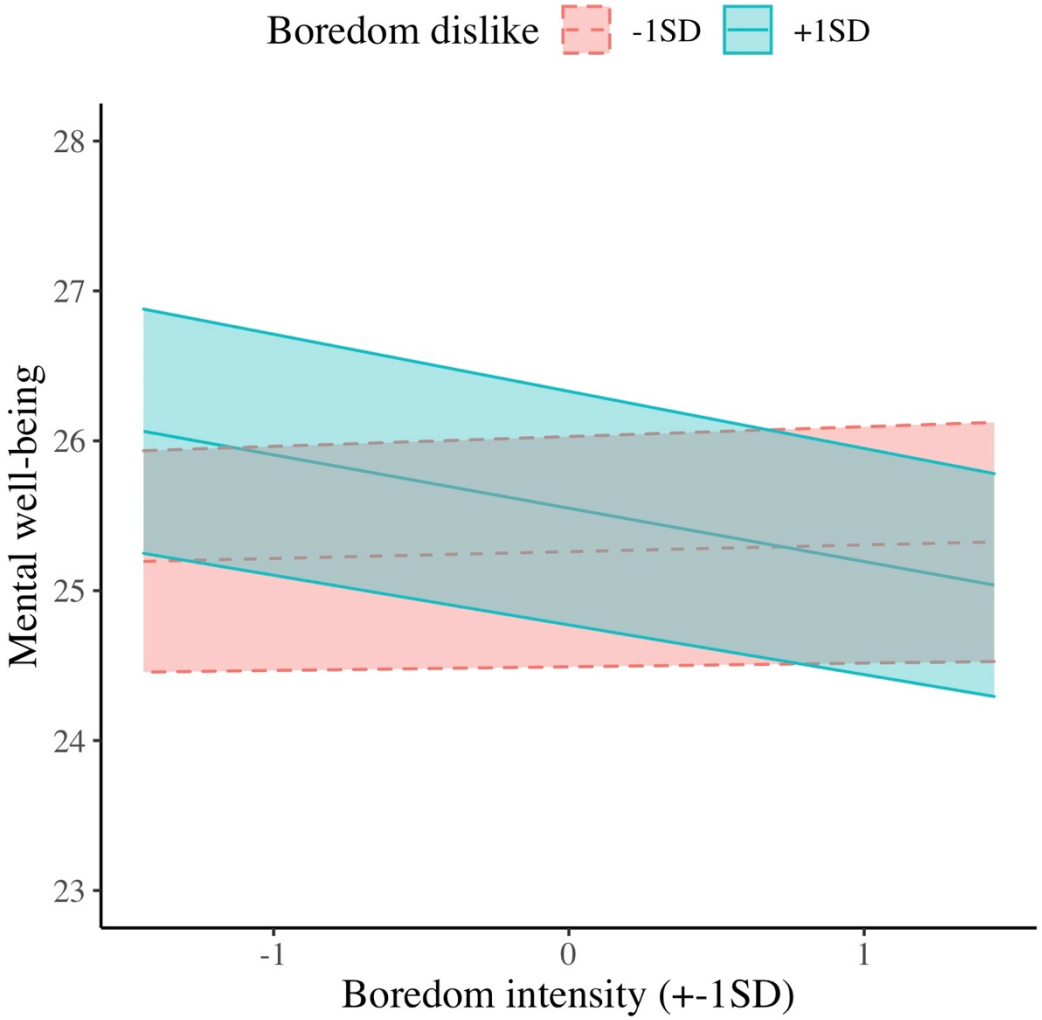


Figure 6.3
Simple Slopes for Within-person Associations of Boredom Dislike and Boredom Intensity in the Prediction of Mental Well-being in Study 2



6.3.3 Discussion

Study 2's results are similar to those in Study 1. Using multi-wave longitudinal data from Israeli adolescents aged 12–18, multilevel modelling analyses revealed that participants experienced boredom more frequently (H1a) and intensely (H1b) when they disliked boredom more strongly than their usual level. Furthermore, participants reported poorer mental well-being when they felt bored more often and more intensely; these associations were stronger at times they reported a higher level of boredom dislike (H2a & H2b).

The results on boredom normalcy were less consistent with Study 1. While Study 1 showed a significant positive association between boredom normalcy and mental well-being, this association was not significant in Study 2. Since between-person associations cannot be used to make assertions about within-person

associations (Snijders & Bosker, 2011), a possible explanation is that the relationship of these variables was different at within-person level (i.e., whether participants reported better mental well-being *at times* they normalized boredom more than their usual) than at the between-person level (i.e., whether participants who normalized boredom *more than others* reported better mental well-being than other participants). Indeed, our analysis with the baseline data revealed a positive association between boredom normalcy and mental well-being at between-person level (reported in Appendix C), which replicated the findings from Study 1. In other words, people who report higher boredom normalcy than others are more likely to report better mental well-being than other people; however, when people momentarily normalize boredom more, those periods are not characterized by better mental well-being.

6.4 General Discussion

Chronic boredom can lead to problematic behaviours (e.g., Biolcati et al., 2018; Malizia, 2018) and psychological distress (Spaeth et al., 2015) among young people. Given that young people are more prone to boredom (Caldwell et al., 1999; Weybright et al., 2020), boredom may be particularly challenging for them during the COVID-19 pandemic. Across two studies, we examined the moderating effect of boredom beliefs on the boredom-mental well-being link among adolescents and young adults in the UK and Israel. The results consistently demonstrate that, at both between- (Study 1) and within-person levels (Study 2), disliking boredom was positively associated with frequency (H1a) and intensity of boredom (H1b), which replicated the findings from Chapter 5. Also, boredom dislike moderated the negative associations of boredom frequency (Studies 1 & 2) and boredom intensity (Study 2) with mental well-being. Specifically, the associations were stronger in higher level of boredom dislike (H2a & H2b). In addition, participants who relatively accepted and normalized boredom reported better mental well-being.

We validated two subscales of the Boredom Beliefs Scale in a sample of young people. The reliability and validity of the subscales were comparable to those of the Hong Kong and the US samples reported in Chapter 4. The 6-item measure replicated the two-factor structure, and was shown to be distinct from boredom experience in CFAs. The current results demonstrated full configural,

full metric, and partial scalar invariance across the two age groups (adolescent and young adult), indicating that the factor structure fit well and that factor loadings are similar across these age groups. The achievement of full metric invariance suggests that adolescents and young adults responded to the items similarly (Steenkamp & Baumgartner, 1998). Failure to find scalar invariance indicates that mean differences of item responses are not the same as the mean differences in the latent variables (Putnick & Bornstein, 2016). Caution should thus be made when directly comparing the mean scores across age groups. In terms of test-retest reliability, the ICCs of boredom beliefs were comparable to those of emotion beliefs in previous research (Veilleux, Warner, et al., 2021).

Our results supported Hypothesis 1. Higher levels of boredom dislike, relative to others and relative to one's average level, were associated with higher levels of boredom frequency and intensity. This aligns with earlier findings on an inverse association between "liking" withdrawal emotion and the intensity of emotional experience (Harmon-Jones et al., 2011), those on positive associations between boredom dislike and boredom indices in Chapter 4, as well as those on between- and within-person associations of boredom dislike and boredom experience in Chapter 5. It is noteworthy that, throughout the present thesis, boredom dislike was consistently positively associated with boredom measures across six samples with participants from Hong Kong, US, UK, and Israel, from adolescents and adults, collected by correlational and longitudinal methods. Boredom normalcy was not significantly associated with boredom frequency and intensity at the between-person level, which is consistent with the results in Chapter 4 on the non-significant association between boredom normalcy and boredom proneness. It was, however, positively associated with boredom frequency and intensity at the within-person level, indicating that people are more inclined to believe that boredom is a normal experience at times they feel bored more frequently and intensely.

For Hypothesis 2, the present research demonstrated a moderating effect of boredom dislike with boredom frequency (and boredom intensity in Study 2) in predicting mental well-being. It indicates that young people who felt bored more often reported a lower level of mental well-being; this relationship was weaker among those who held a more positive affective evaluation of boredom. This result parallels those on the moderating effect of negative affect valuation on the

linkage between negative affective experiences and well-being (Luong et al., 2016). Taking a step further, we also examined the moderating effect at the within-person level. We found that when young people disliked boredom more than their average level, the negative associations of boredom frequency and intensity with mental well-being were stronger.

The associations of mental well-being with boredom dislike and boredom normalcy were significant at the between-person level, but not significant at the within-person level. At the between-person level (i.e., compared with other participants), higher levels of (affective) disliking and (cognitive) unacceptance of boredom were linked with poorer well-being, as revealed in the bivariate correlation and in regression models controlling for boredom frequency or intensity in Study 1. This is consistent with a study that reported a positive relationship between negative attitudes towards emotion and depressive symptoms (Yoon et al., 2018). At the within-person level, the associations of mental well-being with boredom dislike and boredom normalcy were non-significant. This suggests that mental well-being is not linked with within-person fluctuation in levels of boredom dislike and boredom normalcy.

Boredom functions to signal a need for behavioural change (e.g., Bench & Lench, 2019; Danckert, Mugon, et al., 2018; Wolff & Martarelli, 2020). It is possible that people who hate boredom or do not normalize the experience are less able to respond to it adaptively. They might thus (i) evaluate their boredom experience more negatively, (ii) without knowing how to regulate it in an effective or adaptive manner. These might, in turn, make their experience more unpleasant and influence their mental well-being (Ford & Gross, 2019). Chapter 5 shows that participants engaged in more smartphone behaviours if they reported higher levels of boredom dislike compared to others and to their usual levels.

6.4.1 Strengths and Limitations

The present research is comprised of a correlational study with British young people and a multi-wave longitudinal study with Israeli adolescents. The replication of findings using different methods at both between- and within-person levels in two different countries offers strong support to the generalizability of the results. Large sample sizes and ecological validity are other key strengths. Yet, the findings should be interpreted with the consideration of several limitations.

First, given the correlational nature of the findings, the results cannot establish causality between the measured variables. For example, as in Chapter 5, the relationship between boredom beliefs and boredom experience could be bidirectional. It is possible that people dislike boredom because they feel it very often with high intensity, or they more readily pick up the cues of boredom and feel it frequently and intensely because they strongly dislike this emotion. Future studies using an experimental approach would be helpful in elucidating their relationships. Second, we did not administer the full version of the BBS; we omitted the boredom functionality subscale. This was because our studies were part of a larger project that involved several research teams with different research focuses. To keep the biweekly survey within a reasonable length, we could not include the nine items on boredom functionality. We chose to include boredom dislike and boredom normalcy because (i) they appear to be most similar to the emotion beliefs on valuing and accepting emotion in the literature (Harmon-Jones et al., 2011; Luong et al., 2016), and (ii) these two subscales are relatively short (six items in total). Future research is needed to examine how the boredom functionality subscale performs in youth samples. Third, we failed to find scalar invariance for the two subscales across age groups and the boredom normalcy subscale's internal consistency appeared low in Study 1. One possible reason is that the scale was developed from Hong Kong and American samples, and thus performed poorer in British sample. Future research is required to examine their psychometric properties across cultural and age groups.

6.4.2 Implications

To the best of our knowledge, this is the first study that investigated youth boredom beliefs. It was conducted during the COVID-19 pandemic—a high-risk context in which boredom was especially difficult to escape. Accumulating studies have pointed to the undesirable effects of boredom in the pandemic (e.g., Boylan et al., 2021; Chao et al., 2020; Wolff et al., 2020); yet, limited research has examined how they can be ameliorated. Our studies contribute to the literature by presenting timely, promising findings on the role of boredom beliefs in altering the mental health impact of boredom. It offers novel insights on potential intervention and preparation for similar high-risk situations in the future. The considerable within-person variability in boredom beliefs shown in Study 2

suggests that these beliefs fluctuate over time and thus they could be the target of intervention. Future research could investigate, for example, if education on the value of boredom reduces young people's boredom dislike and promotes their well-being.

Researchers (Martarelli & Wolff, 2020) argue that the pandemic containment policies likely intensify boredom and impose self-control demands that are particularly challenging for young people. Considering the findings on boredom and non-compliance to pandemic measures (Boylan et al., 2021; Brosowsky et al., 2021; Wolff et al., 2020), and that young people are poorer at self-control (Casey & Caudle, 2013), they might be at higher risk of engaging in impulsive, problematic behaviours in response to boredom during the pandemic. Future research can consider examining the role of boredom beliefs in these relationships.

As this is the first study that examined lay beliefs about boredom in an adolescent sample, it raised more questions than it answered, such as why some young people hate boredom more than others and how to intervene on boredom dislike. These questions could be investigated in future studies using the boredom dislike and boredom normalcy subscales we validated in the present research. For instance, the measures could be applied in educational contexts—where detrimental effects of boredom on academic performance are well documented (Tze et al., 2016)—to understand the role of boredom beliefs.

6.5 Conclusion

The detrimental mental health impact of chronic boredom is evident, and the COVID-19 pandemic might have worsened it. The present correlational and multi-wave longitudinal studies demonstrated that disliking boredom is associated with more frequent and intense boredom experiences. The negative association between boredom and mental well-being is more salient if young people dislike this emotion strongly. Normalizing the occurrence of boredom, on the contrary, is associated with better mental well-being. Additionally, we validated our measure of boredom beliefs in two youth samples. Overall, this chapter underscores the importance of boredom beliefs on boredom experience and mental well-being.

Chapter 7

General Discussion

7.1 Summary of Main Findings

The current thesis examined the role of boredom beliefs in boredom experience, coping and well-being. We formulated a theory to understand boredom (Chapter 2), examined the characterizations of boredom proneness (Chapter 3), identified people's lay beliefs about boredom (Chapter 4), and investigated the implications of these beliefs on boredom experience, coping, and well-being (Chapters 5 & 6). It should be noted that some samples are used in multiple chapters in addressing different research questions. An overview of all the samples is presented in Table 7.1. A total of eight samples were collected from Hong Kong, US, UK, and Israel, from adolescents and adults, by qualitative, correlational, and longitudinal methods. Different analysis methods, such as path analysis, thematic analysis, factor analysis, moderation analysis, and multilevel modelling, were applied to investigate the research questions listed in Table 1.1.

Table 7.1

An Overview of Samples Reported in the Current Thesis

Descriptor	Sample A	Sample B	Sample C	Sample D	Sample E	Sample F	Sample G	Sample H
Design	Correlational	Correlational	Correlational	Longitudinal	Qualitative	Correlational	Correlational	Longitudinal
Sample size[a]	231 (T1), 203 (T2)	495	123	487 (T1), 279 (T2), 203 (T3)	29	296	2495	314
Location	HK	US	HK	HK	HK	UK	UK	Israel
Gender	83 men, 148 women	265 men, 230 women	56 men, 67 women	122 men, 365 women	13 men, 16 women	79 men, 216 women, 1 other	744 men, 1751 women	160 men, 154 women
Average age	27.6	35.8	23.6	22.6	19.0[b]	33.9	17.9	15.5
Age range	18–71	18–73	18–60	17–62	18–23[b]	18–75	12–25	12–18
Sample type	Hong Kong citizens	American MTurk workers	HKU students	HKU students	HKU students	British Prolific workers	British young people	Israeli adolescents
Medium of data collection	Online survey(s)				Interviews	Online survey(s)		
Time of data collection	Mar – Apr 2019	Aug 2019	May 2019	Feb – Apr 2020 (T1), Jun – Aug 2020 (T2), Aug 2020 – Jan 2021 (T3)	Feb 2018, Jan – Feb 2019	Oct 2021	May – Dec 2020	May – Sep 2020
Used in	Chapter 3 Study 1, Chapter 4 Study 2	Chapter 3 Study 1, Chapter 4 Study 2, Chapter 5 Study 1	Chapter 3 Study 2	Chapter 3 Study 2, Chapter 5 Study 2	Chapter 4 Study 1	Chapter 4 Study 3	Chapter 6 Study 1	Chapter 6 Study 2

Note. HKU = The University of Hong Kong, HK = Hong Kong, US = United States, UK = United Kingdom, T1 = Time 1, T2 = Time 2, T3 = Time 3.

[a] Sample size after exclusion.

[b] Information about participants in the individual interviews only.

CHAPTER 7 – GENERAL DISCUSSION

This thesis begins with a review of theories and empirical findings on boredom, in Chapter 2, and proposes the Boredom Feedback Model (BFM). The BFM explicates key antecedents, experiences, and consequences of boredom. In this model, the process of boredom is characterized by attention shifts instigated by inadequate attentional engagement. When people are bored, their attention shifts in, out or back to the source of boredom, leading to varying cognitive or behavioural outcomes (e.g., mind-wandering, sadistic aggression, snacking; Danckert, Hammerschmidt, et al., 2018; Moynihan et al., 2015; Pfattheicher et al., 2020). If where attention lies is not adequately engaging, the model starts from the beginning in a form of a feedback loop, intensifying boredom and giving rise to other negative emotions over time. This might be prolonged by maladaptive boredom coping.

The prolonged experience of boredom, commonly referred as boredom proneness, is associated with a wide range of problematic behaviours and mental health problems (e.g., risk-taking, depression, anxiety; Fahlman et al., 2009; Kılıç et al., 2020; Lee & Zelman, 2019). However, there have been recurring criticisms over the conceptual ambiguity over the construct (Struk et al., 2017; Vodanovich & Watt, 2016). To investigate potential characterizations of boredom proneness, Chapter 3 tested whether it represents the individual differences in boredom frequency, boredom intensity, and/or a holistic perception of life being boring (perceived life boredom). Across two studies (Samples A to D), each of the three characterizations was found to represent some aspects of boredom proneness. Among them, perceived life boredom best characterized it and reproduced most of its associations with personality, life satisfaction, depression, anxiety, and stress.

In additional to understanding state and chronic boredom, Chapters 2 and 3 raise three questions—(i) What keeps one in the feedback loop of boredom? (ii) What affects one's coping with boredom? and (iii) What mitigates the mental health impacts of boredom? Drawing upon the insights from emotion belief literature (e.g., Ford & Gross, 2018; Harmon-Jones et al., 2011; Luong et al., 2016), lay beliefs about boredom might affect boredom experience, coping and well-being. Chapter 4 explored what boredom beliefs people have through qualitative (Sample E) and survey data (Samples A, B & F). It identified three boredom beliefs—whether people endorse the functions of boredom (boredom functionality), dislike the emotion (boredom dislike), and normalise its experience

(boredom normalcy). It also developed and validated the Boredom Beliefs Scale (BBS) to measure these beliefs. The scale demonstrated excellent validity, reliability, and measurement invariance across two-week time and across cultural groups (Hong Kong and the US).

Chapters 5 and 6 then scrutinize the implications of boredom beliefs. With correlational (Sample B) and longitudinal (Sample D) data, Chapter 5 tested the moderating role of boredom dislike on boredom experience (operationalised as boredom frequency and intensity) and smartphone use. In correlational (Sample G) and longitudinal (Sample H) studies with British and Israeli young people, Chapter 6 investigated whether boredom dislike moderates the association between boredom experience and mental well-being. Both chapters revealed consistent positive associations between boredom dislike and boredom experience. Further, the positive association between boredom and excessive smartphone use (Chapter 5), as well as the negative association between boredom and mental well-being (Chapter 6), were stronger in higher boredom dislike. These results were mostly consistent at both within- and between-person levels. Taken together, the current thesis presents evidence on the importance of boredom beliefs in boredom experience, coping and well-being.

7.2 Synthesis

Boredom beliefs potentially exert influences on each component of the BFM, including antecedent, experience, consequence, and feedback loop of boredom. First, it is possible that people who dislike boredom might be (i) more sensitive to the cues of boredom, such as repetitiveness and meaninglessness of a situation, (ii) have lower intention to attend to stimuli they find boring, and/or (iii) have higher desired level of attentional engagement; all these could give rise to boredom (antecedents of boredom in BFM). Results of this thesis demonstrated that higher boredom dislike, compared to others and compared to one's usual level, predicted higher boredom frequency (Chapters 5 & 6).

Second, disliking boredom might result in more negative and intense affective experience of boredom (experiences of boredom and feedback loop in BFM). Boredom dislike was positively associated with boredom intensity at both within- and between-person levels (Chapters 5 & 6). When participants with

higher level of boredom dislike felt bored more intensely, those occasions were characterised by poorer mental well-being (Chapter 6).

Third, boredom dislike might influence where bored people direct their attention to (consequences of boredom in BFM). Specifically, they might be more likely to direct their attention away from the source of boredom. Our studies illustrated that disliking boredom was positively associated with smartphone use from self-report and objective data, at both between- and within-person levels (Chapter 5).

These influences of boredom dislike might seem minimal at each stage, yet collectively they might shift the overall experience of boredom. This argument is supported by the findings of this thesis. Given that behavioural avoidance is shown to be the least effective boredom coping strategy (Eren & Coskun, 2016; Nett et al., 2010, 2011), frequent avoidance of boredom through smartphone use, which was associated with boredom dislike, might prolong the experience of boredom. We found positive associations of excessive smartphone use with boredom frequency and intensity (Chapter 5). Prolonged experience of boredom, as boredom proneness, boredom frequency, boredom intensity and/or perceived life boredom, was associated with lower life satisfaction and more psychological distress (Chapter 3). As shown in correlational and longitudinal data, boredom dislike was positively associated with all four of these boredom indices (Chapters 4 to 6) as well as poorer mental well-being (Chapter 6). Taken together, boredom dislike might be a stable factor that shapes boredom experience, coping and well-being.

7.3 Implications

7.3.1 Theoretical Implications

The results from the current thesis have several theoretical implications. The thesis proposed a new conceptualisation of boredom—the Boredom Feedback Model—which integrates diverging empirical findings and proposes testable hypotheses for future research. It examined the characterizations of boredom proneness which helped make sense of its hitherto poorly understood relationship with mental health. It extended boredom literature to a new scope of research on lay beliefs about boredom.

Moreover, this thesis provides novel insights for emotion literature in general. To the best of our knowledge, this is the first attempt to investigate people's beliefs about an emotion through a bottom-up approach. Existing research examines emotion beliefs through measures developed from theories or clinicians' experience (e.g., Becerra et al., 2020; Harmon-Jones et al., 2011; Karnaze & Levine, 2018; Veilleux et al., 2021) rather than from lay people. We examined people's boredom beliefs through the process of qualitative investigation and scale development, which offers new, interesting perspectives on how people think about boredom. For instance, while researchers suggest that boredom functions to monitor and regulate behaviours (e.g., Elpidorou, 2014; Van Tilburg & Igou, 2012), our participants pointed out some other values of boredom such as training people's patience and helping people differentiate what is truly meaningful or interesting to them. Further investigation on boredom beliefs can be conducted using the BBS we developed and validated across different cultural (Chapter 4) and age groups (Chapter 6).

7.3.2 Practical Implications

The current thesis has practical implications in clinical, educational, and occupational contexts. In clinical settings, the relationships of chronic boredom with problematic behaviours (e.g., Biolcati et al., 2018; Elhai et al., 2018) and clinical symptoms (e.g., Fahlman et al., 2009; Goldberg et al., 2011) are well documented. There is, however, scarce research on how these relationships could be mitigated. One study has examined the moderating role of dispositional mindfulness on boredom proneness and symptoms of depression, anxiety and stress (Lee & Zelman, 2019). This thesis offers theoretical explanation on how people might develop maladaptive behaviours and psychological distress under boredom (Chapter 2), as well as empirical evidence that perceiving one's life as boring might have greater negative impacts on mental health than actual experiences of boredom (Chapter 3). It shows that boredom dislike moderated the associations of boredom with excessive smartphone use and mental well-being (Chapters 5 & 6). Given considerable within-person variations in boredom dislike in the Hong Kong and Israel longitudinal data (Chapters 5 & 6), this belief could be a target of intervention, supporting the argument that modifying emotion

beliefs might be a promising treatment approach (Ford & Gross, 2019; Wittkamp et al., 2022).

In educational settings, boredom brings a wide range of adverse academic outcomes such as poorer academic performance (e.g., Pekrun et al., 2010, 2014; Putwain et al., 2018; Tze et al., 2016) and lower learning motivation (e.g., Pekrun et al., 2010; Tam et al., 2020). It was found that students who favoured behavioural-avoidance strategies to cope with boredom had poorer academic profile (Nett et al., 2010). Findings from the current thesis indicate that boredom beliefs might alter how one experiences and copes with boredom (Chapter 5). Further, they showed that the BBS is a reliable and valid measure in adolescent sample (Chapter 6). Using this scale, future research could investigate the effects of boredom beliefs in academic context.

In occupational settings, boredom proneness was found to be associated with counterproductive work behaviour (Bruursema et al., 2011), job stress, work presenteeism, tendency to procrastinate (H. C. Wan et al., 2014), lower job satisfaction (Kass et al., 2001), and poorer job performance (Watt & Hargis, 2010). This thesis highlights the attention processes underlying boredom (Chapter 2). It presents empirical findings that boredom proneness was characterized by boredom frequency, boredom intensity, and perceived life boredom (Chapter 3), and that it was positively associated with boredom dislike (Chapter 4). Future studies could identify interventions that help workers better engage in their work. The role of boredom beliefs in work context could also be examined by applying the BBS.

7.4 Limitations and Future Directions

Limitations for each study are addressed in the respective chapters. In what follows, the overall limitations of this thesis are discussed. To begin with, we examined boredom from the perspective that it is an emotion. There are, however, other propositions of boredom. For example, some researchers suggest that boredom is a state of mind (Wangh, 1975), a mood (Iso-Ahola & Weissinger, 1990), or a feeling of a particular mode of thinking (Eastwood & Gorelik, 2019), and that there are different types of boredom based on the levels of valence and arousal (Goetz et al., 2014). This thesis assumes boredom to be an emotion (e.g.,

Smith & Ellsworth, 1985; Van Tilburg & Igou, 2017a), and that it is a unitary construct (Elpidorou, 2021).

Further, most constructs in our studies were assessed through self-report measures, as opposed to behavioural measures; most of our findings were correlational rather than experimental. These are partly due to the difficulties in conducting in-person experiments under the Hong Kong protests in 2019 and COVID-19 pandemic since 2020. For example, we had been conducting a lab experiment investigating the moderating effect of boredom dislike on boredom experience and smartphone use (behavioural data), but it was suspended halfway through the data collection. Future research should consider using experimental method and behavioural measures to examine the directionality and causality of boredom beliefs, experience, coping and well-being.

Moreover, we only examined specific boredom beliefs, boredom dislike and/or boredom normalcy, in Chapters 5 and 6. Boredom dislike was selected to be the focus of investigation due to its similarities with other emotion beliefs in existing research (Ford, Lam, et al., 2018; Luong et al., 2016). The roles of boredom functionality and boredom normalcy need further theoretical and empirical investigation.

7.4.1 Cross-cultural Perspective

Although we collected data from diverse places, including Hong Kong, US, UK, and Israel, we did not examine cross-cultural differences in boredom beliefs, experience, and coping. Considering the interlocking relationships of boredom experience with cognitive appraisals (Chapter 2), life perception (Chapter 3), as well as boredom beliefs (Chapters 4 to 6), it would be of interest to examine cross-cultural and cross-generational differences in how people conceptualise boredom and perceive boring situations. While there are extensive reviews on western literary and philosophical history of the concept of boredom (see Elpidorou, 2014; Lomas, 2017; Martin et al., 2006), the rest of the picture, such as its meaning in Asian or African cultural contexts, has been neglected thus far. We highlight some narrative characteristics of boredom in a few Asian languages, in the hope of providing insights for further investigation.

As a case in point, in Chinese, *mun* (in Cantonese; or *men* in Mandarin) is a common word used to describe boredom. The word appeared as early as

770B.C.–256B.C. in *I Ching*. Differing from its current meaning, in ancient time mun mostly referred to feeling gloomy and stuck instead of tedium. It is usually used along with other characters to describe feelings like distress, bitterness, troubled, and sadness, suggesting that mun has been conceptualized as an aversive state that often occurs with other negative emotions. Apart from mun, *mou liu* (in Cantonese; or *wu liao* in Mandarin) is another term for boredom, which literally connotes *no meaning*. Since ancient time, this term has been used to illustrate an absence of something, physically or mentally, to be entrusted on.

Intriguingly, there is an absence of a particular word describing the bored feeling in Filipino and Japanese languages. In Tagalog, *inip* may be the closest cousin of boredom; it represents a sense of being tired of waiting or getting tired of someone or something. In Japanese, *taikutsu* is used to describe something is boring; people would describe something or a situation as boring (*tsumaranai*) to indicate that they are feeling bored. Again, these two cultures do not have a word specifically for the feeling of boredom. This begs the question: If the word boredom does not exist in one's native language, whether members of that culture would experience boredom differently? Future research is needed to unpack how culture shapes one's understanding and experience of boredom.

7.5 Closing Remark

悶 (*Mun* in Cantonese; or *men* in Mandarin), the Chinese character for boredom, symbolises a heart being locked up. The same character can also mean uncomfortable, stuffy air. These connotations point to the image of feeling sick for being stuck in boredom for too long. Yet, whether boredom is "the root of all evil" or an innate encouragement for change depends on how one chooses to see it and respond to it. Boredom beliefs potentially shape people's daily boredom experience, behaviours, and well-being. I hope that the current thesis helps people reappraise boredom, *such that* they know where their hearts desire, and venture out for meaningful pursuits.

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Appendix A.

Supplementary Materials for Chapter 3[11]

A.1 Development and Validation of the Perceived Life Boredom Scale

A.1.1 Overview

The section below presents the development and validation of the Perceived Life Boredom Scale (PLBS).

We followed the recommended practice by Henson and Roberts (2006) in examining the factor structure of PLBS. We split the US Sample in Study 1 into half: subsample A (n = 248) and subsample B (n = 247). An exploratory factor analysis (EFA) with maximum likelihood estimation was first performed on the correlation matrix of the seven items in the US subsample A. The number of factors to retain was determined using parallel analysis (Horn, 1965) and Velicer's minimum average partial (MAP; Velicer, 1976). The model developed using EFA was then subjected to a confirmatory factor analysis (CFA) in the Study 1's US subsample B and the HK Sample. Model fit was considered good if robust confirmatory fit index (CFI) and robust Tucker–Lewis index (TLI) were greater than .95, whereas robust root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) were less than .08 (Hu & Bentler, 1999).

The psychometric properties of PLBS, including internal consistency, test-retest reliability in the HK Sample, and validity, were also evaluated. After that, we tested the measurement invariance across HK and US samples with multigroup CFA. In a stepwise approach, we first examined configural invariance to see whether the factor structure was invariant across the two groups, and then constrained parameters in testing metric invariance (factor loadings) and scalar invariance (intercepts). The metric invariance model was compared against the

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[11] Appendix A is based on the supplementary materials for a published article:

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

configural invariance model, and the scalar invariance model was compared against the metric invariance model. Invariance was established if the change of CFI (ΔCFI) does not exceed .010 (Cheung & Rensvold, 2002) and the RMSEA value falls within the comparing model's RMSEA confidence intervals (Timmons, 2010).

A.1.2 Results

Table A1 displays the descriptive statistics for items on PLBS, including means, standard deviations, ranges, skewness, and kurtosis.

Factor Structure

An EFA was conducted on the seven-items correlation matrix of the US subsample A (n = 248) using maximum likelihood estimation. Both parallel analysis and Velicer's MAP recommended a one-factor solution. Table A2 presents the items' factor loadings, communalities, factor's eigenvalue and explained variance. The single factor accounted for 64.0% of the total item variance.

We then cross-validated the single factor structure using CFA with robust maximum likelihood estimation in the US subsample B (n = 247) and the HK Sample (N = 231). In the US subsample B, the one-factor model demonstrated reasonable model fit in the CFA, $\chi^2(14) = 31.7$, $p = .004$, Robust CFI = .980, Robust TLI = .970, Robust RMSEA = .084, 90% *CI* [.045, .123], SRMR = .032. Standardized factor loadings ranged from .43 to .89 for the factor (see Table A3). All items loaded significantly ($p < .001$) on the factor. The one-factor model also demonstrated good model fit in CFA in the HK Sample, $\chi^2(14) = 24.5$, $p = .040$, Robust CFI = .983, Robust TLI = .974, Robust RMSEA = .065, 90% *CI* [.014, .107], SRMR = .035. Standardized factor loadings ranged from .36 to .90 for the factor (see Table A3). All items loaded significantly ($p < .001$) on the factor.

Reliability and Validity

The scale demonstrated excellent internal consistency, with Cronbach's alphas of .92 in US Sample and .87 in HK Sample. To estimate the test-retest reliability of the scale, 206 (89.2%) of the HK respondents responded to the follow-up survey two weeks later. Of these, three failed the attention check, resulting in a follow-up sample of 203 participants. It showed great test-retest

reliability with a strong intraclass correlation (ICC) of .77 between Time 1 and Time 2 in HK Sample. To test its convergent and discriminant validity, we conducted zero-order correlations between perceived life boredom, boredom proneness, frequency and intensity of boredom, personality subscales, and satisfaction with life, as shown in the results in the main text (Table 3.1).

Measurement Invariance

Fit indices for the measurement invariance models and comparisons are presented in Table A4. We found configural invariance (CFI = .974; RMSEA = .092), as well as metric and scalar invariance, with ΔCFIs < .010 and RMSEA values falling within the RMSEA confidence intervals of the comparing models. These indicate that the construct of perceived life boredom was not significantly variant across the two groups.

Overall, the study indicates that the seven-item PLBS is a unidimensional measure. It has good reliability and validity, and seems invariant across HK and US samples in assessing people's perception of how boring their lives are.

APPENDIX A

Table A1

Descriptive statistics for items on Perceived Life Boredom Scale

	Study 1's US Sample (N = 495)					Study 1's HK Sample (N = 231)					Study 2 (N = 608)				
Item	*M*	*SD*	Range	Skewness	Kurtosis	*M*	*SD*	Range	Skewness	Kurtosis	*M*	*SD*	Range	Skewness	Kurtosis
1	3.64	1.98	1-7	0.14	-1.26	2.96	1.48	1-7	0.53	-0.59	3.23	1.65	1-7	0.31	-0.87
2	3.70	2.08	1-7	0.11	-1.37	3.06	1.54	1-7	0.46	-0.58	3.03	1.67	1-7	0.53	-0.71
3	4.58	1.77	1-7	-0.43	-0.72	4.38	1.50	1-7	-0.29	-0.60	4.29	1.62	1-7	-0.27	-0.71
4	3.31	2.02	1-7	0.39	-1.18	2.50	1.34	1-7	0.94	0.46	2.57	1.52	1-7	0.84	-0.10
5	4.47	1.89	1-7	-0.36	-0.96	3.88	1.63	1-7	0.19	-0.98	3.94	1.67	1-7	-0.07	-0.85
6	3.91	1.92	1-7	0.00	-1.13	3.28	1.48	1-7	0.38	-0.72	3.54	1.63	1-7	0.10	-0.90
7	4.04	2.05	1-7	-0.15	-1.29	3.26	1.71	1-7	0.38	-0.91	3.59	1.77	1-7	0.13	-1.12

Note. Participants received the following instructions: "The following are some statements that may or may not describe your perception of life. Please rate on a seven-point scale to indicate the extent to which you agree with the statement. There are no right or wrong answers. We are interested only in your thoughts towards life, not in how others think." Items were rated on a scale of (1) strongly disagree to (7) strongly agree.

Table A2

Summary of Exploratory Factor Analysis Results using Maximum Likelihood Estimation in Study 1's US subsample A (n = 248)

		Factor loadings	
	Item	Factor 1	h^2
1	My life is boring.	0.88	0.78
2	My life is going nowhere.	0.85	0.72
3	There is always something less boring than what I am doing.	0.49	0.24
4	There is nothing fun in my life.	0.86	0.73
5	There is a mismatch between what I want to do and what I am doing now.	0.69	0.47
6	My life lacks novelty.	0.86	0.75
7	Compared with others, my life is boring.	0.90	0.81
	Eigenvalues	4.50	
	% of variance	64	

Note. h^2 = communalities.

APPENDIX A

Table A3

Standardized Factor Loadings from Confirmatory Factor Analysis in Study 1's US subsample B (n = 247) and HK Sample (N = 231)

		US subsample B	HK Sample
		Factor loadings	
	Item	Factor 1	Factor 1
1	My life is boring.	0.89	0.90
2	My life is going nowhere.	0.82	0.75
3	There is always something less boring than what I am doing.	0.43	0.36
4	There is nothing fun in my life.	0.84	0.77
5	There is a mismatch between what I want to do and what I am doing now.	0.69	0.66
6	My life lacks novelty.	0.87	0.70
7	Compared with others, my life is boring.	0.89	0.81

Table A4

Goodness-of-fit Indices of the Measurement Invariance Models

					Difference tests				
Model	χ^2	*df*	CFI	RMSEA [90% *CI*]	ΔCFI	ΔRMSEA	$\Delta\chi^2$	Δ*df*	*p*
Configural invariance	113.75	28	0.974	0.092 [0.075, 0.110]					
Metric invariance	129.88	34	0.971	0.088 [0.072, 0.104]	0.003[a]	0.004	16.128	6	0.013
Scalar invariance	136.02	40	0.971	0.081 [0.067, 0.097]	0.000[b]	0.007	6.1426	6	0.407

Note. df = degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; 90% *CI* = 90% confidence interval.

[a]Difference between configural and metric invariance models.

[b]Difference between metric and scalar invariance models.

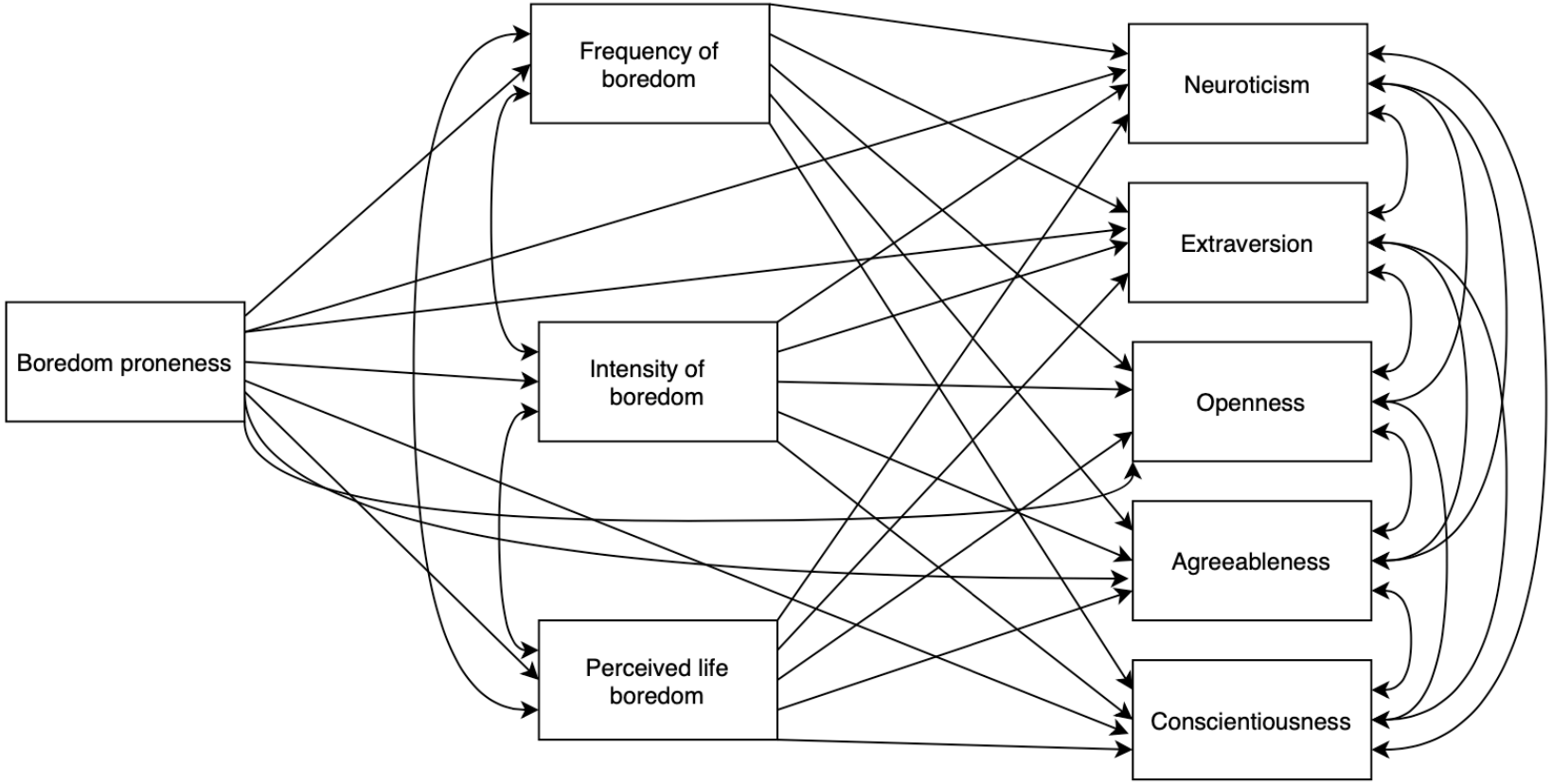
A.2 Indirect Effect Analyses with Personality as Outcome Variable in Study 1

We examined whether the three characterizations could account for the correlations that boredom proneness had with personality. We did so with a path model (Figure A1) where the three characterizations were included as mediators (1,000 bootstrap samples). We also conducted the same analysis (1,000 bootstrap samples) to test the path model with a single item representing perceived life boredom (i.e., “My life is boring”). Table A5 (results with full PLBS) and Table A6 (results with single item from PLBS) presents the indirect effects in the models, and Table A7 (results with full PLBS) and Table A8 (results with single item from PLBS) displays the changes in model fit indices after constraining the paths of indirect effects through perceived life boredom and intensity of boredom, and the paths of indirect effects through perceived life boredom and frequency of boredom. In the US Sample, there were significant indirect effects of boredom proneness through life boredom on neuroticism, extraversion, and openness. Among them, the indirect effects through perceived life boredom on neuroticism and extraversion were significantly larger than those through intensity of boredom (but not frequency of boredom). In the HK Sample, there was an indirect effect of boredom proneness through perceived life boredom on neuroticism, but it was not significantly larger than the indirect effects through frequency and intensity.

APPENDIX A

Figure A1

Proposed Path Model of the Effects of Boredom Proneness, Frequency and Intensity of Boredom, and Perceived Life Boredom on Big-Five Personality Traits in Study 1



APPENDIX A

Table A5

Indirect effects of Boredom Proneness on Personality from Indirect Effect Analysis in Study 1

	Indirect effects of boredom proneness					
	on Neuroticism		on Extraversion		on Openness	
	β	95% *CI*	β	95% *CI*	β	95% *CI*
US Sample (*N* = 495)						
through frequency of boredom	0.056	[-.002, .008]	-0.026	[-.008, .005]	-0.021	[-.006, .004]
through intensity of boredom	0.010	[-.004, .005]	0.106	[.001, .011]	0.111	[.001, .009]
through perceived life boredom	0.179	[.005, .017]	-0.149	[-.015, -.002]	0.107	[.000, .010]
HK Sample (*N* = 231)						
through frequency of boredom	0.046	[-.005, .012]	-0.051	[-.011, .005]	0.077	[-.004, .016]
through intensity of boredom	0.056	[-.001, .010]	0.045	[-.003, .009]	0.024	[-.003, .007]
through perceived life boredom	0.178	[.006, .023]	-0.065	[-.013, .003]	-0.056	[-.014, .005]

	Indirect effects of boredom proneness			
	on Agreeableness		on Conscientiousness	
	β	95% *CI*	β	95% *CI*
US Sample (*N* = 495)				
through frequency of boredom	0.012	[-.004, .006]	-0.085	[-.009, .001]
through intensity of boredom	0.008	[-.004, .004]	-0.003	[-.004, .003]
through perceived life boredom	-0.014	[-.006, .005]	-0.050	[-.007, .003]
HK Sample (*N* = 231)				
through frequency of boredom	-0.052	[-.010, .004]	-0.074	[-.013, .002]
through intensity of boredom	0.042	[-.002, .007]	-0.021	[-.006, .003]
through perceived life boredom	-0.067	[-.013, .005]	-0.070	[-.013, .004]

Note. 95% *CI* = 95% confidence interval.

Table A6

Indirect effects of Boredom Proneness on Personality from Indirect Effect Analysis with Single Item representing Perceived Life Boredom in Study 1

	Indirect effects of boredom proneness					
	on Neuroticism		on Extraversion		on Openness	
	β	95% *CI*	β	95% *CI*	β	95% *CI*
US Sample (*N* = 495)						
through frequency of boredom	0.042	[-.003, .008]	-0.016	[-.007, .006]	-0.013	[-.006, .005]
through intensity of boredom	0.027	[-.002, .006]	0.092	[.000, .010]	0.122	[.002, .010]
through perceived life boredom[a]	0.147	[.005, .014]	-0.117	[-.011, -.002]	0.042	[-.002, .006]
HK Sample (*N* = 231)						
through frequency of boredom	0.051	[-.004, .012]	-0.040	[-.010, .005]	0.074	[-.004, .016]
through intensity of boredom	0.058	[-.001, .010]	0.046	[-.002, .009]	0.023	[-.003, .007]
through perceived life boredom[a]	0.117	[.002, .016]	-0.137	[-.017, -.002]	-0.026	[-.011, .007]

	Indirect effects of boredom proneness			
	on Agreeableness		on Conscientiousness	
	β	95% *CI*	β	95% *CI*
US Sample (*N* = 495)				
through frequency of boredom	0.003	[-.005, .006]	-0.072	[-.008, .002]
through intensity of boredom	0.006	[-.003, .004]	-0.007	[-.004, .003]
through perceived life boredom[a]	0.015	[-.004, .005]	-0.064	[-.008, .001]
HK Sample (*N* = 231)				
through frequency of boredom	-0.045	[-.010, .005]	-0.075	[-.012, .003]
through intensity of boredom	0.043	[-.002, .007]	-0.021	[-.007, .003]
through perceived life boredom[a]	-0.116	[-.015, .001]	-0.057	[-.011, .005]

Note. 95% *CI* = 95% confidence interval.

[a]Measured by a single item from Perceived Life Boredom Scale, i.e., "My life is boring."

APPENDIX A

Table A7

Changes in Model Fit Indices after Constraining Paths of Indirect Effects in Study 1

	US Sample (N = 495)				HK Sample (N = 231)			
	ΔCFI	ΔRMSEA	$\Delta\chi^2$	p	ΔCFI	ΔRMSEA	$\Delta\chi^2$	p
Constraining the indirect effects of boredom proneness through perceived life boredom and intensity of boredom								
on Neuroticism	0.004	0.123	8.451	0.004	0.005	0.104	3.484	0.062
on Extraversion	0.007	0.159	13.535	< .001	0.003	0.077	2.377	0.123
on Openness	0	0	0.004	0.950	0.001	0.034	1.272	0.259
on Agreeableness	0	0	0.110	0.740	0.003	0.080	2.472	0.116
on Conscientiousness	0	0	0.636	0.425	0	0	0.538	0.463
Constraining the indirect effects of boredom proneness through perceived life boredom and frequency of boredom								
on Neuroticism	0.001	0.067	3.219	0.073	0.004	0.088	2.792	0.095
on Extraversion	0.001	0.051	2.273	0.132	0	0	0.027	0.869
on Openness	0.001	0.057	2.592	0.107	0.003	0.076	2.348	0.125
on Agreeableness	0	0	0.111	0.739	0	0	0.030	0.862
on Conscientiousness	0	0	0.260	0.610	0	0	0.004	0.952

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation.

APPENDIX A

Table A8

Changes in Model Fit Indices after Constraining Paths of Indirect Effects in Study 1 with Single Item Perceived Life Boredom in the Model

	US Sample (N = 495)				HK Sample (N = 231)			
	ΔCFI	ΔRMSEA	$\Delta\chi^2$	*p*	ΔCFI	ΔRMSEA	$\Delta\chi^2$	*p*
Constraining the indirect effects of boredom proneness through perceived life boredom[a] and intensity of boredom								
on Neuroticism	0.003	0.100	5.903	0.015	0	0	0.942	0.332
on Extraversion	0.007	0.153	12.627	< .001	0.015	0.175	8.069	0.005
on Openness	0.001	0.042	1.888	0.169	0	0	0.573	0.449
on Agreeableness	0	0	0.023	0.878	0.011	0.153	6.373	0.012
on Conscientiousness	0	0.025	1.318	0.251	0	0	0.355	0.551
Constraining the indirect effects of boredom proneness through perceived life boredom[a] and frequency of boredom								
on Neuroticism	0.001	0.056	2.554	0.110	0	0	0.767	0.381
on Extraversion	0	0.036	1.645	0.200	0.001	0.043	1.418	0.234
on Openness	0	0	0.517	0.472	0.001	0.046	1.497	0.221
on Agreeableness	0	0	0.024	0.877	0	0	0.804	0.370
on Conscientiousness	0	0	0.014	0.906	0	0	0.051	0.821

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation.

[a]Measured by a single item from Perceived Life Boredom Scale, i.e., “My life is boring.”

A.3 Results from the Two Samples in Study 2

A.3.1 Overview

Study 2's sample was formed by combining two samples, Sample C (n = 150) and Sample D (n = 534) in Table 7.1. The section below presents the demographics, comparisons, and individual results from the two samples.

Both samples were collected from The University of Hong Kong. For Sample C, we excluded one duplicate response (n = 1), participants who did not provide responses other than demographic information (n = 19), those who aged under 18 (n = 2), and those who failed an attention check item (n = 5), resulting in a sample of 123 participants (54.5% female; age range = [18, 60], M = 23.6, SD = 6.87). A sensitivity analysis indicated that this sample allowed us to detect effect of ρ = .25 in size with a power of .80 (α = .05, two-sided). For Sample D, we excluded two participants who did not provide responses towards any of the interested variables in Study 2 (n = 2), and those who failed an attention check item (n = 47), resulting in a sample of 485 participants (75.0% female; age range = [17, 62], M = 22.6, SD = 6.02). A sensitivity analysis indicated that this sample allowed us to detect effect of ρ = .13 in size with a power of .80 (α = .05, two-sided).

A.3.2 Comparisons of the Two Samples

The table below presents the comparisons between the two samples (Table A9).

Table A9

Comparisons between Two Samples in Study 2

	Sample C (n = 123)	Sample D (n = 485)		
	M(SD)	M(SD)	t/X^2(df)	p
Age	23.63 (6.87)	22.57 (6.02)	1.71 (606)	0.089
Gender	-	-	19.15 (1)	< .001
Frequency of boredom	4.19 (1.88)	5.41 (1.94)	-6.23 (601)	< .001
Intensity of boredom	4.09 (1.95)	4.69 (1.90)	-3.08 (601)	0.002
Boredom proneness	24.21 (8.28)	20.79 (6.77)	4.77 (603)	< .001
Perceived life boredom	3.05 (1.10)	3.56 (1.32)	-3.94 (604)	< .001
Depression	10.05 (9.01)	12.51 (10.05)	-2.46 (599)	0.014
Anxiety	10.16 (7.71)	10.86 (8.73)	-0.80 (599)	0.424
Stress	13.08 (8.66)	14.77 (9.13)	-1.84 (599)	0.066

A.3.3 Results

Criterion 1: Relationships Between Boredom Measures

Table A10 displays the means, standard deviations, and correlations of the measured variables in Sample C (n = 123) and Sample D (n = 485). Results from multiple regression analyses are presented in Table A11. In Sample C, only intensity ($\beta = .23$, $p = .005$) and perceived life boredom ($\beta = .56$, $p < .001$) were significantly associated with boredom proneness. Constraining the associations for perceived life boredom and intensity of boredom to be equal resulted in a significantly worsened model fit, ΔCFI = .226, ΔRMSEA = .403, $\Delta\chi^2 = 20.8$, $p < .001$. Constraining the associations for perceived life boredom and frequency of boredom to be equal also resulted in a significantly worsened model fit, ΔCFI = .263, ΔRMSEA = .435, $\Delta\chi^2 = 24.1$, $p < .001$. In Sample D, all three characterizations were associated with boredom proneness (frequency: $\beta = .20$, $p < .001$; intensity: $\beta = .13$, $p < .001$; perceived life boredom: $\beta = .56$, $p < .001$). Constraining the associations for perceived life boredom and frequency of boredom to be equal resulted in a significantly worsened model fit, ΔCFI = .165, ΔRMSEA = .364, $\Delta\chi^2 = 64.5$, $p < .001$. Constraining the associations for perceived life boredom and intensity of boredom to be equal likewise resulted in a significantly worsened model fit, ΔCFI = .245, ΔRMSEA = .444, $\Delta\chi^2 = 95.5$, $p < .001$. These indicate that, in both samples, the association between perceived life boredom and boredom proneness was significantly greater than that between boredom intensity and boredom proneness, and that between boredom frequency and boredom proneness.

Criterion 2: Reproducing Correlations with Depression, Anxiety, and Stress

Across both samples, all three characterizations reproduced the correlations that boredom proneness had with depression, anxiety and stress (Table A10).

Table A10

Means, Standard deviations, and Correlations in Sample C and Sample D

	M	*SD*	1	2	3	4
Sample C (*n* = 123)						
1. Boredom proneness	24.21	8.28	-			
2. Frequency of boredom	4.19	1.88	0.48***	-		
3. Intensity of boredom	4.09	1.95	0.49***	0.59***	-	
4. Perceived life boredom	3.05	1.10	0.68***	0.50***	0.40***	-
5. Depression	10.05	9.01	0.67***	0.34***	0.29**	0.64***
6. Anxiety	10.16	7.71	0.47***	0.18*	0.15	0.41***
7. Stress	13.08	8.66	0.57***	0.28**	0.23*	0.52***
Sample D (*n* = 485)						
1. Boredom proneness	20.79	6.77	-			
2. Frequency of boredom	5.41	1.94	0.54***	-		
3. Intensity of boredom	4.69	1.90	0.44***	0.58***	-	
4. Perceived life boredom	3.56	1.32	0.70***	0.48***	0.35***	-
5. Depression	12.51	10.05	0.67***	0.40***	0.35***	0.66***
6. Anxiety	10.86	8.73	0.48***	0.27***	0.31***	0.43***
7. Stress	14.77	9.13	0.50***	0.29***	0.35***	0.47***

Note. Boredom proneness was measured by Short Boredom Proneness Scale. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table A11

Regression Models with Boredom Proneness as Outcome Variable in Sample C and Sample D

	Sample C (*n* = 123)			Sample D (*n* = 485)		
Predictor	B	SE	β	B	SE	β
Intercept	24.157	0.523		20.808	0.207	
Frequency of boredom	0.288	0.372	0.065	0.683	0.140	0.196***
Intensity of boredom	0.960	0.339	0.226**	0.462	0.135	0.130***
Perceived life boredom	4.197	0.555	0.561***	2.868	0.179	0.561***
R^2	0.525			0.556		

Note. All predictors were centered. Boredom proneness was measured by Short Boredom Proneness Scale. ** $p < .01$, *** $p < .001$.

Criterion 3: Accounting for Correlation with Depression, Anxiety, and Stress

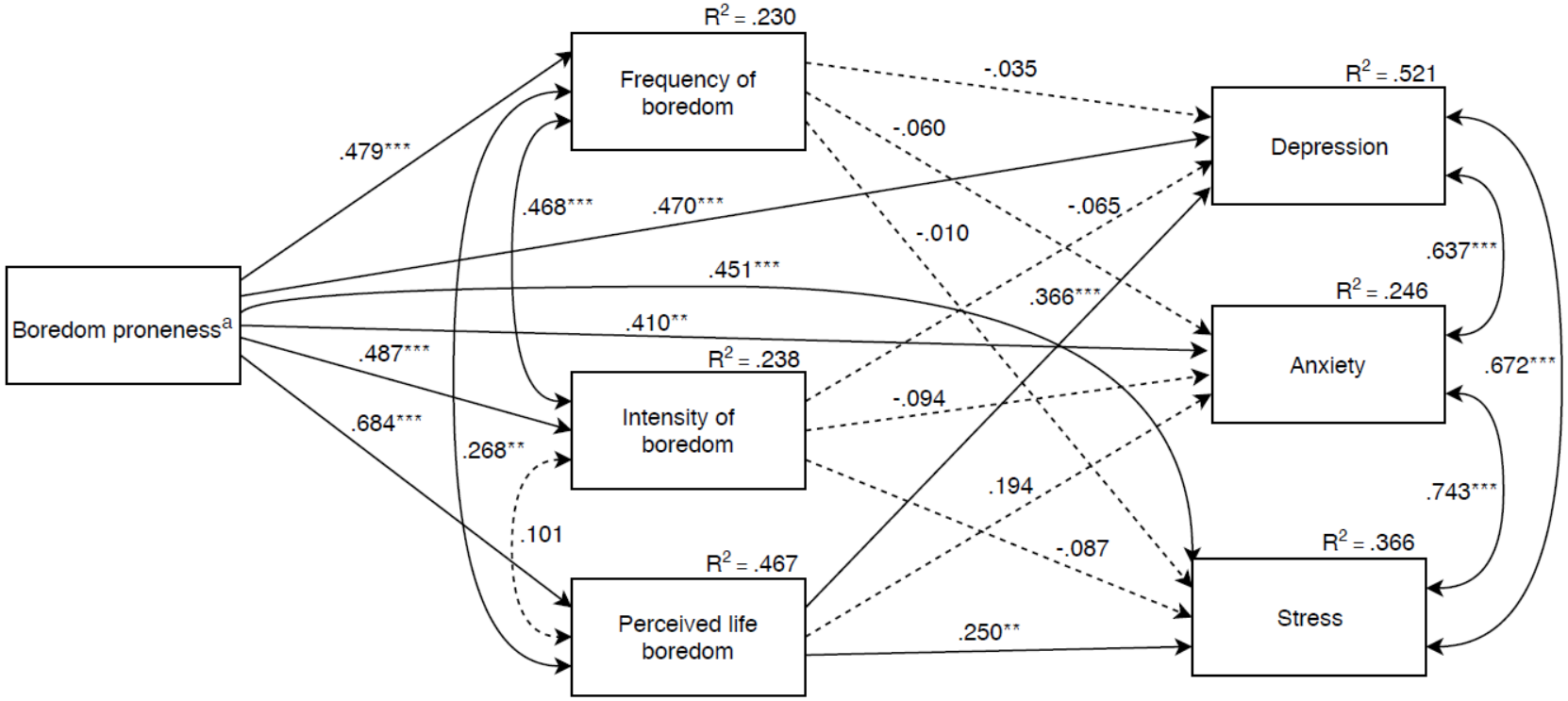
Sample C. We conducted an indirect effect analysis with 1,000 bootstrap samples to test the proposed path model, examining through which boredom construct(s) boredom proneness was associated with symptoms of depression, anxiety, and stress. We used FIML to handle the small amount of missing data at item level (0.5%). Standardized path coefficients are presented in Figure A2. Boredom proneness was positively associated with perceived life boredom ($\beta = .68$, $p < .001$), frequency ($\beta = .48$, $p < .001$), and intensity of boredom ($\beta = .49$, $p < .001$). Depression was significantly associated with boredom proneness ($\beta = .47$, $p < .001$) and perceived life boredom ($\beta = .37$, $p < .001$). Stress was also significantly associated with boredom proneness ($\beta = .45$, $p < .001$) and perceived life boredom ($\beta = .25$, $p = .004$). There was a significant positive association between boredom proneness and anxiety symptoms, $\beta = .41$, $p = .001$. The association between perceived life boredom and anxiety symptoms was non-significant, $\beta = .19$, $p = .053$.

There were indirect effects of boredom proneness, through perceived life boredom, on symptoms of depression ($\beta = .25$, 95% *CI* [.151, .423]), anxiety ($\beta = .13$, 95% *CI* [.007, .265]), and stress ($\beta = .17$, 95% *CI* [.048, .327]). The indirect effects of boredom proneness on symptoms of depression, anxiety and stress, through frequency and intensity of boredom, were non-significant.

Constraining the paths of indirect effects through perceived life boredom and intensity of boredom on depression to be equal significantly worsened model fit ($\Delta CFI = .026$, $\Delta RMSEA = .330$, $\Delta\chi^2 = 14.4$, $p < .001$). This also applies to the indirect effects on anxiety ($\Delta CFI = .006$, $\Delta RMSEA = .153$, $\Delta\chi^2 = 3.88$, $p = .049$) and stress ($\Delta CFI = .011$, $\Delta RMSEA = .212$, $\Delta\chi^2 = 6.51$, $p = .011$). Constraining the paths of indirect effects through perceived life boredom and frequency of boredom on depression to be equal resulted in significantly worsened model fit ($\Delta CFI = .018$, $\Delta RMSEA = .274$, $\Delta\chi^2 = 10.2$, $p = .001$), but not so for anxiety ($\Delta CFI = .003$, $\Delta RMSEA = .111$, $\Delta\chi^2 = 2.50$, $p = .114$) and stress ($\Delta CFI = .005$, $\Delta RMSEA = .142$, $\Delta\chi^2 = 3.49$, $p = .062$).

Figure A2

Path Model of the Effects of Boredom Proneness, Frequency and Intensity of Boredom, and Perceived Life Boredom on Depression, Anxiety and Stress in Sample C



Note. Path coefficients are standardized estimates. Solid paths indicate significant effects, dashed lines are not significant.
[a]Measured by Short Boredom Proneness Scale.
** $p < .01$, *** $p < .001$.

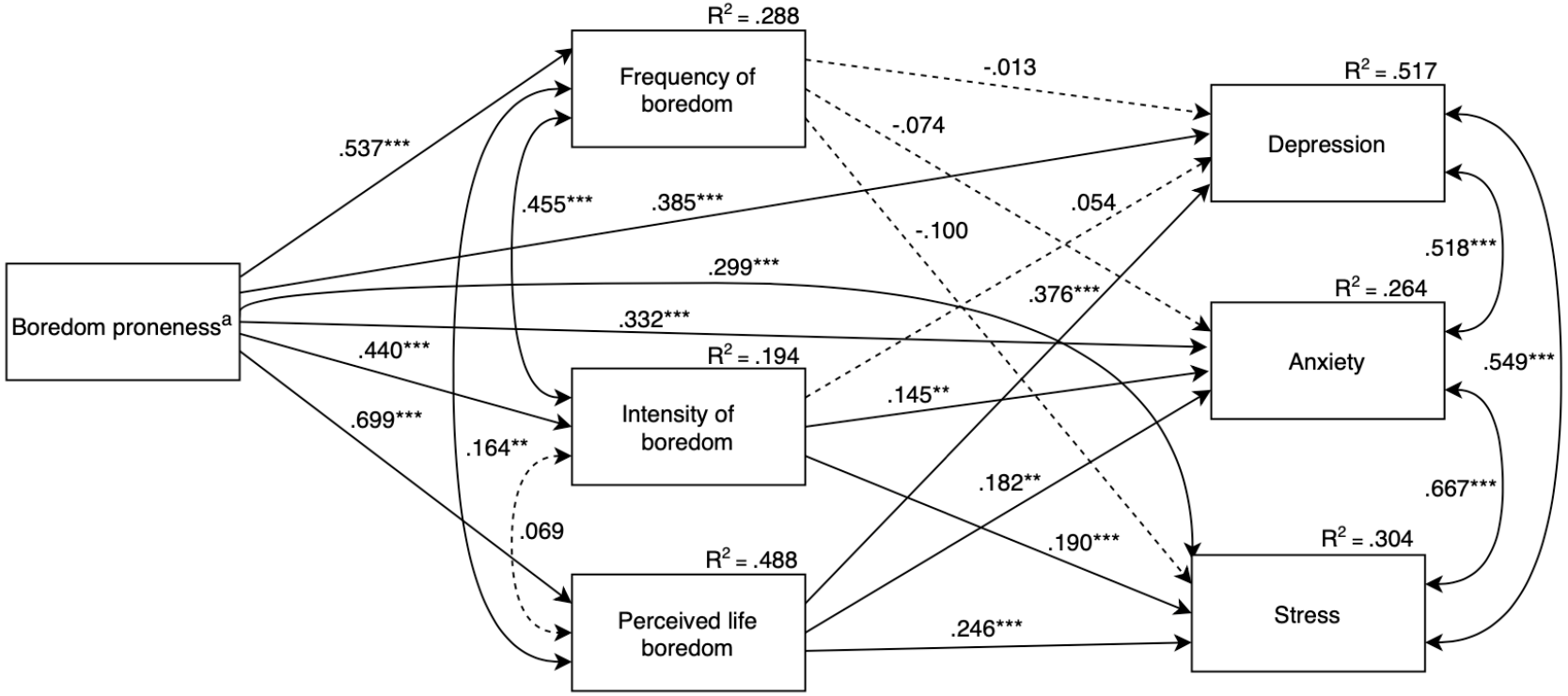
Sample D. We conducted the same analysis with 1,000 bootstrap samples to test the proposed path model in Sample D. We used FIML to handle the small amount of missing data at item level (0.9%). Standardized path coefficients are presented in Figure A3. Boredom proneness was positively associated with perceived life boredom (β = .70, $p < .001$), frequency (β = .54, $p < .001$), and intensity of boredom (β = .44, $p < .001$). Depression was significantly associated with boredom proneness (β = .39, $p < .001$) and perceived life boredom (β = .38, $p < .001$). Anxiety was significantly associated with boredom proneness (β = .33, $p < .001$), perceived life boredom (β = .18, $p = .002$), and intensity of boredom (β = .15, $p = .002$). Stress was also significantly associated with boredom proneness (β = .30, $p < .001$), perceived life boredom (β = .25, $p < .001$), and intensity of boredom (β = .19, $p < .001$).

There were indirect effects of boredom proneness, through perceived life boredom, on symptoms of depression (β = .26, 95% *CI* [.282, .511]), anxiety (β = .13, 95% *CI* [.066, .277]), and stress (β = .17, 95% *CI* [.125, .350]). There were also indirect effects of boredom proneness, through intensity of boredom, on anxiety (β = .064, 95% *CI* [.029, .142]) and stress (β = .084, 95% *CI* [.055, .175]), but not on depression (β = .024, 95% *CI* [-.018, .092]). The indirect effect of boredom proneness, through frequency of boredom, on stress was significant (β = -.054, 95% *CI* [-.154, -.002]), but those on symptoms of depression (β = -.007, 95% *CI* [-.079, .056]), and anxiety (β = -.040, 95% *CI* [-.126, .018]) were not.

Constraining the paths of indirect effects through perceived life boredom and intensity of boredom on depression to be equal significantly worsened model fit (ΔCFI = .021, ΔRMSEA = .285, $\Delta\chi^2 = 40.4$, $p < .001$). This also applies to the indirect effect on stress (ΔCFI = .002, ΔRMSEA = .078, $\Delta\chi^2 = 3.91$, $p = .048$), but not the indirect effect on anxiety (ΔCFI = .001, ΔRMSEA = .044, $\Delta\chi^2 = 1.96$, $p = .162$). Constraining the paths of indirect effects through perceived life boredom and frequency of boredom on depression to be equal resulted in significantly worsened model fit (ΔCFI = .021, ΔRMSEA = .280, $\Delta\chi^2 = 39.0$, $p < .001$), but not so for anxiety (ΔCFI = .005, ΔRMSEA = .139, $\Delta\chi^2 = 10.4$, $p = .001$) and stress (ΔCFI = .010, ΔRMSEA = .197, $\Delta\chi^2 = 19.9$, $p < .001$).

Figure A3

Path Model of the Effects of Boredom Proneness, Frequency and Intensity of Boredom, and Perceived Life Boredom on Depression, Anxiety and Stress in Sample D



Note. Path coefficients are standardized estimates. Solid paths indicate significant effects, dashed lines are not significant.
[a]Measured by Short Boredom Proneness Scale.
** $p < .01$, *** $p < .001$.

A.4 Indirect Effect Analyses with Single Item Representing Perceived Life Boredom

A.4.1 Overview

In the main studies, perceived life boredom was measured by the seven-item PLBS while frequency and intensity of boredom were assessed with single-item measures. Considering that the results might be due to difference in the number of items, we took one item from PLBS with the highest face validity (i.e., "My life is boring") to represent perceived life boredom and tested the same path models as in the main text. The sections below present the results from these indirect effect analyses.

A.4.2 Study 1's US Sample

With one item representing perceived life boredom, we tested the same model again using indirect effect analysis with 1,000 bootstrap samples with the US Sample. Full information maximum likelihood estimation (FIML; Arbuckle, 1996) was applied to handle a small amount of missing data (< .1%). Standardized path coefficients are displayed in Figure A4. Boredom proneness was positively associated with perceived life boredom ($\beta = .67$, $p < .001$), frequency ($\beta = .70$, $p < .001$) and intensity of boredom ($\beta = .60$, $p < .001$). Perceived life boredom ($\beta = -.34$, $p < .001$), intensity of boredom ($\beta = .21$, $p = .001$) and boredom proneness ($\beta = -.17$, $p = .014$) were associated with life satisfaction. Frequency of boredom ($\beta = .12$, $p = .143$) was not significantly associated with life satisfaction.

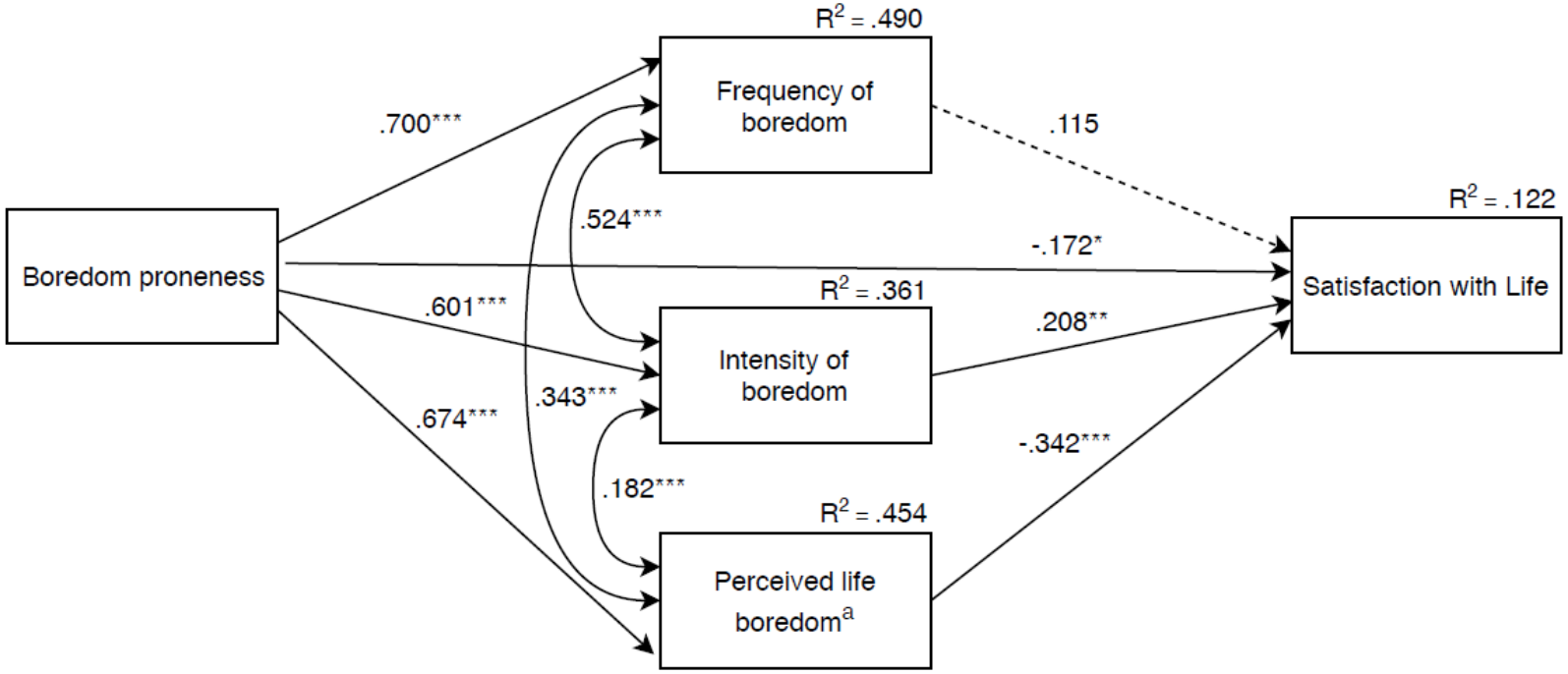
The indirect effects of boredom proneness on life satisfaction, through perceived life boredom ($\beta = -.23$, 95% *CI* [-.103, -.044]) and intensity of boredom ($\beta = .13$, 95% *CI* [.017, .066]), were significant. The indirect effects of boredom proneness on life satisfaction, through frequency of boredom ($\beta = .081$, 95% *CI* [-.010, .062]), was again not significant.

Constraining the paths of indirect effects through perceived life boredom and intensity of boredom to be equal significantly worsened the model fit, $\Delta CFI = .034$, $\Delta RMSEA = .279$, $\Delta\chi^2 = 39.5$, $p < .001$. Constraining the paths of indirect effects through perceived life boredom and frequency of boredom to be equal also resulted in significantly worsened model fit, $\Delta CFI = .014$, $\Delta RMSEA = .181$, $\Delta\chi^2 = 17.2$, $p < .001$.

APPENDIX A

Figure A4

Path Model of the Effects of Boredom Proneness, Frequency and Intensity of Boredom, and Perceived Life Boredom on Life Satisfaction in Study 1's US Sample



Note. Path coefficients are standardized estimates. Solid paths indicate significant effects, dashed lines are not significant.
[a]Measured by a single item from Perceived Life Boredom Scale, i.e., "My life is boring."
* $p < .05$, ** $p < .01$, *** $p < .001$.

A.4.3 Study 1's HK Sample

We conducted an indirect effect analysis with 1,000 bootstrap samples on the HK sample to test the path model as in the main text but with a single item representing perceived life boredom. Standardized path coefficients are presented in Figure A5. Boredom proneness was positively associated with perceived life boredom ($\beta = .62$, $p < .001$), frequency ($\beta = .58$, $p < .001$) and intensity of boredom ($\beta = .42$, $p < .001$). Whereas perceived life boredom ($\beta = -.39$, $p < .001$) and intensity of boredom ($\beta = -.16$, $p = .033$) were negatively associated with life satisfaction, no direct effect of boredom proneness ($\beta = -.11$, $p = .199$) or frequency of boredom ($\beta = .019$, $p = .828$) on life satisfaction was found.

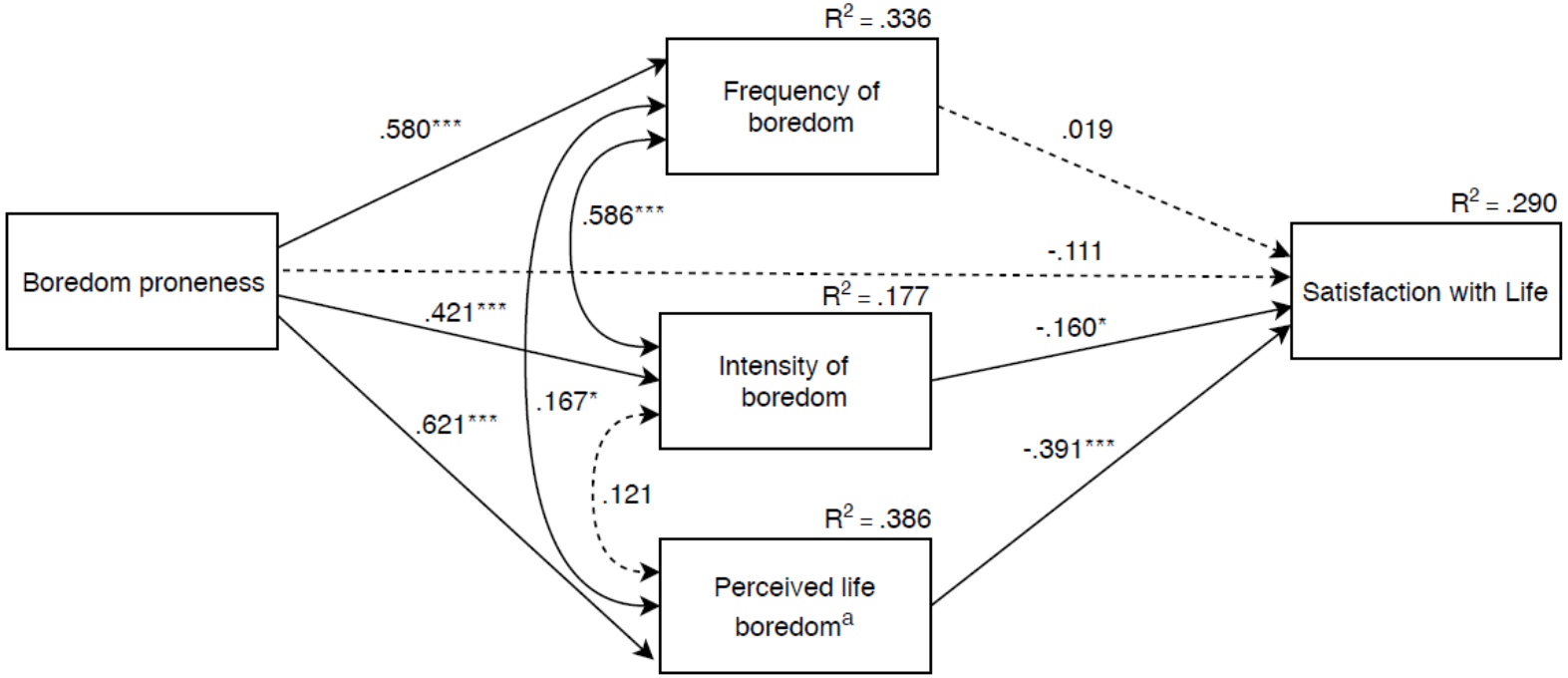
The indirect effects of boredom proneness on life satisfaction, through perceived life boredom ($\beta = -.24$, 95% *CI* [-.125, -.051]) and intensity of boredom ($\beta = -.067$, 95% *CI* [-.046, -.001]), were significant. The indirect effects of boredom proneness on life satisfaction, through frequency of boredom ($\beta = .011$, 95% *CI* [-.034, .039]), was not significant.

Constraining the paths of indirect effects through perceived life boredom and intensity of boredom to be equal significantly worsened in model fit, $\Delta CFI = .018$, $\Delta RMSEA = .183$, $\Delta\chi^2 = 8.70$, $p = .003$. Also, constraining the paths of indirect effects through perceived life boredom and frequency of boredom to be equal resulted in significantly worsened model fit, $\Delta CFI = .026$, $\Delta RMSEA = .221$, $\Delta\chi^2 = 12.2$, $p < .001$.

APPENDIX A

Figure A5

Path Model of the Effects of Boredom Proneness, Frequency and Intensity of Boredom, and Perceived Life Boredom on Life Satisfaction in Study 1's HK Sample



Note. Path coefficients are standardized estimates. Solid paths indicate significant effects, dashed lines are not significant.
[a]Measured by a single item from Perceived Life Boredom Scale, i.e., "My life is boring."
* $p < .05$, *** $p < .001$.

A.4.4 Study 2

With single item representing perceived life boredom, we conducted indirect effect analysis with 1,000 bootstrap samples with the same model as in the main text. We used full information maximum likelihood estimation (FIML; Arbuckle, 1996) due to a small amount of missing data at item level (0.9%). Standardized path coefficients are presented in Figure A6. Boredom proneness was positively associated with perceived life boredom (β = .57, $p < .001$), frequency (β = .45, $p < .001$) and intensity of boredom (β = .42, $p < .001$).

Depression was significantly associated with boredom proneness (β = .43, $p < .001$) and perceived life boredom (β = .30, $p < .001$). Anxiety was significantly associated with boredom proneness (β = .36, $p < .001$), perceived life boredom (β = .13, $p = .004$), and intensity of boredom (β = .10, $p = .021$). Stress was also significantly associated with boredom proneness (β = .34, $p < .001$), perceived life boredom (β = .20, $p < .001$), and intensity of boredom (β = .14, $p = .002$).

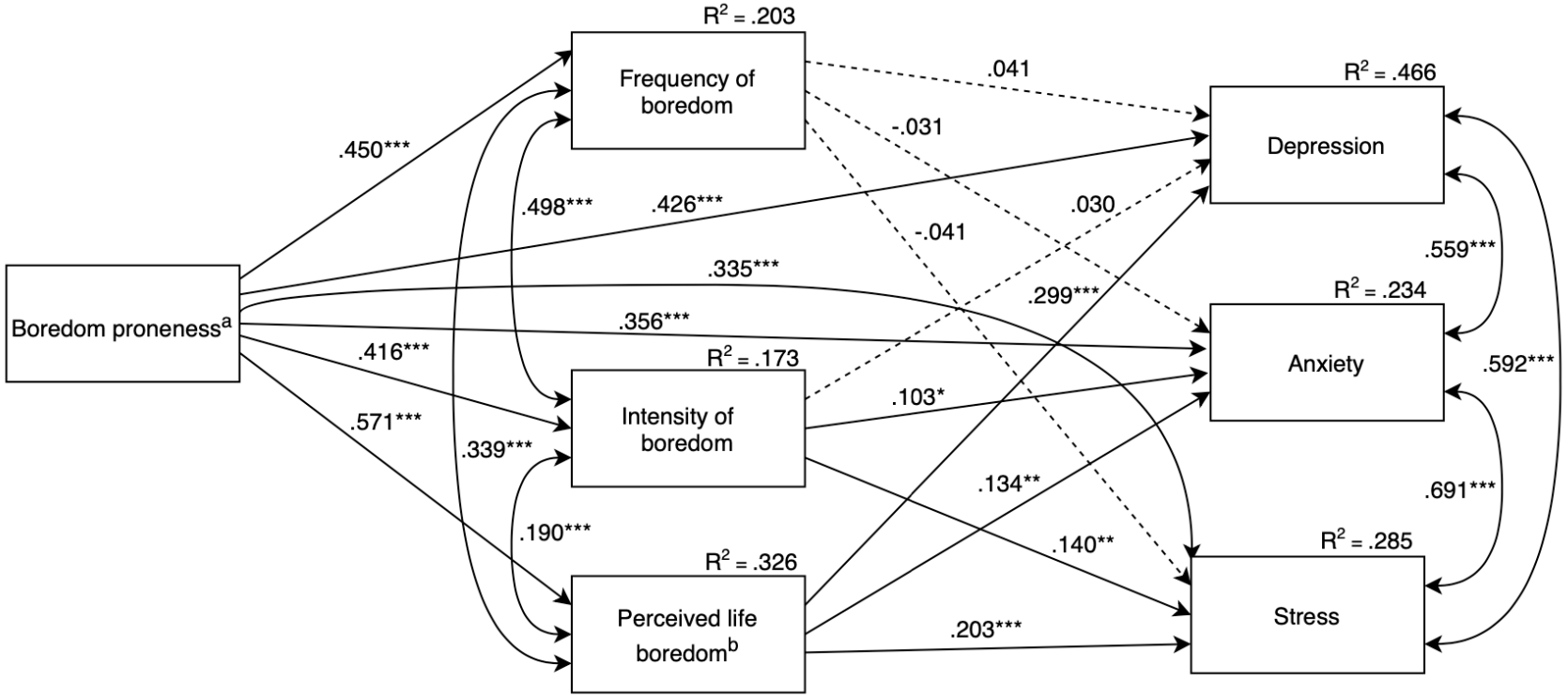
There were indirect effects of boredom proneness, through perceived life boredom, on depression (β = .17, 95% CI [.162, .308]), anxiety (β = .077, 95% *CI* [.030, .158]), and stress (β = .12, 95% *CI* [.077, .213]). There were indirect effects of boredom proneness, through intensity of boredom, on anxiety (β = .043, 95% *CI* [.010, .096]) and stress (β = .058, 95% *CI* [.028, .124]), but not on depression (β = .013, 95% *CI* [-.021, .063]). The indirect effects of boredom proneness on depression, anxiety and stress—through frequency of boredom—were non-significant.

Constraining the paths of indirect effects through perceived life boredom and intensity of boredom on depression to be equal significantly worsened model fit (ΔCFI = .014, ΔRMSEA = .221, $\Delta\chi^2 = 30.7$, $p < .001$). This does not apply to the indirect effects on anxiety (ΔCFI = 0, ΔRMSEA = .008, $\Delta\chi^2 = 1.04$, $p = .309$) and stress (ΔCFI = .001, ΔRMSEA = .059, $\Delta\chi^2 = 3.11$, $p = .078$). Constraining the paths of indirect effects through perceived life boredom and frequency of boredom on depression to be equal resulted in significantly worsened model fit (ΔCFI = .009, ΔRMSEA = .181, $\Delta\chi^2 = 20.8$, $p < .001$). This also applies to the indirect effects on anxiety (ΔCFI = .002, ΔRMSEA = .086, $\Delta\chi^2 = 5.45$, $p = .020$) and stress (ΔCFI = .005, ΔRMSEA = .138, $\Delta\chi^2 = 12.6$, $p < .001$).

APPENDIX A

Figure A6

Path Model of the Effects of Boredom Proneness, Frequency and Intensity of Boredom, and Perceived Life Boredom on Depression, Anxiety and Stress in Study 2



Note. Path coefficients are standardized estimates. Solid paths indicate significant effects, dashed lines are not significant.
[a]Measured by Short Boredom Proneness Scale.
[b]Measured by a single item from Perceived Life Boredom Scale, i.e., "My life is boring."
* $p < .05$, ** $p < .01$, *** $p < .001$

Appendix B.

Supplementary Materials for Chapter 5

B.1 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 (Sample D in Table 7.1). 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).

Appendix C.

Supplementary Materials for Chapter 6[12]

C.1 Validation of the Boredom Beliefs Scale in Studies 1 and 2

Given that the boredom dislike and boredom normalcy subscales have not been validated in adolescent samples, we examined their psychometric properties, including their factor structure (Studies 1 & 2), whether they are psychometrically distinct from boredom experience (Study 1), and their measurement invariance across age groups (Study 1).

C.1.1 Factor Analysis

Data Analysis

We conducted a confirmatory factor analysis (CFA) to validate the two-factor structure on the six items in both studies. Robust comparative fit index (CFI) and robust Tucker–Lewis index (TLI) greater than .90, robust root mean squared error of approximation (RMSEA) and standardized root mean squared residual (SRMR) values less than .08 are indicative of good fit (Hu & Bentler, 1999).

Results

In Study 1's UK sample (N = 2,495), the two-factor model demonstrated fair model fit, Robust $\chi^2(8) = 171.258$, $p < .001$; Robust CFI = .936; Robust TLI = .880; Robust RMSEA = .096, 90% *CI* [.084, .109]; SRMR = .058. Standardized factor loadings ranged from .55 to .81 for boredom dislike, and .29 to .96 for boredom normalcy (Table C1). All the items loaded significantly ($p < .001$) on the respective factors. We compared the two-factor model with a single factor model; the single factor model was significantly poorer fitting, $\Delta\chi^2 = 434.42$, $p < .001$; Δ

[12] Appendix C is based on the supplementary materials for an article in press:

Tam, K. Y. Y., Chan, C. S., Van Tilburg, W. A. P., Lavi, I., & Lau, J. Y. F. (in press). 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.* https://doi.org/10.1111/jopy.12764

Robust CFI = .258; Δ Robust TLI = .417, Δ Robust RMSEA = -.108, Δ SRMR = -.070.

We ran the same CFA with the baseline data of Study 2's Israel sample (N = 293). The two-factor model demonstrated fair model fit, Robust $\chi^2(8) = 27.22$, p = .001; Robust CFI = .936; Robust TLI = .881; Robust RMSEA = .097, 90% *CI* [.058, .138]; SRMR = .078. Standardized factor loadings ranged from .46 to .84 for boredom dislike, and .48 to .70 for boredom normalcy (Table C1). All the items loaded significantly ($p < .001$) on the respective factors. We compared the two-factor model with a single factor model; the single factor model was significantly poorer fitting, $\Delta\chi^2 = 118.41$, $p < .001$; Δ Robust CFI = .313; Δ Robust TLI = .510, Δ Robust RMSEA = -.125, Δ SRMR = -.077.

Table C1

Standardized Factor Loadings from Confirmatory Factor Analysis of the Six Items

		Study 1 (N = 2,495)		Study 2 (N = 293)	
Item		Boredom dislike	Boredom normalcy	Boredom dislike	Boredom normalcy
2	I am afraid of being bored	.55		.46	
3	I hate being bored	.75		.76	
4	Boredom drags down my mood	.81		.84	
1	Sometimes people have to learn to live with boredom		.29		.48
5	Boredom is a natural emotional response		.47		.70
6	It is okay to feel bored		.96		.67

C.1.2 Psychometric Distinction between Boredom Beliefs and Boredom Experience

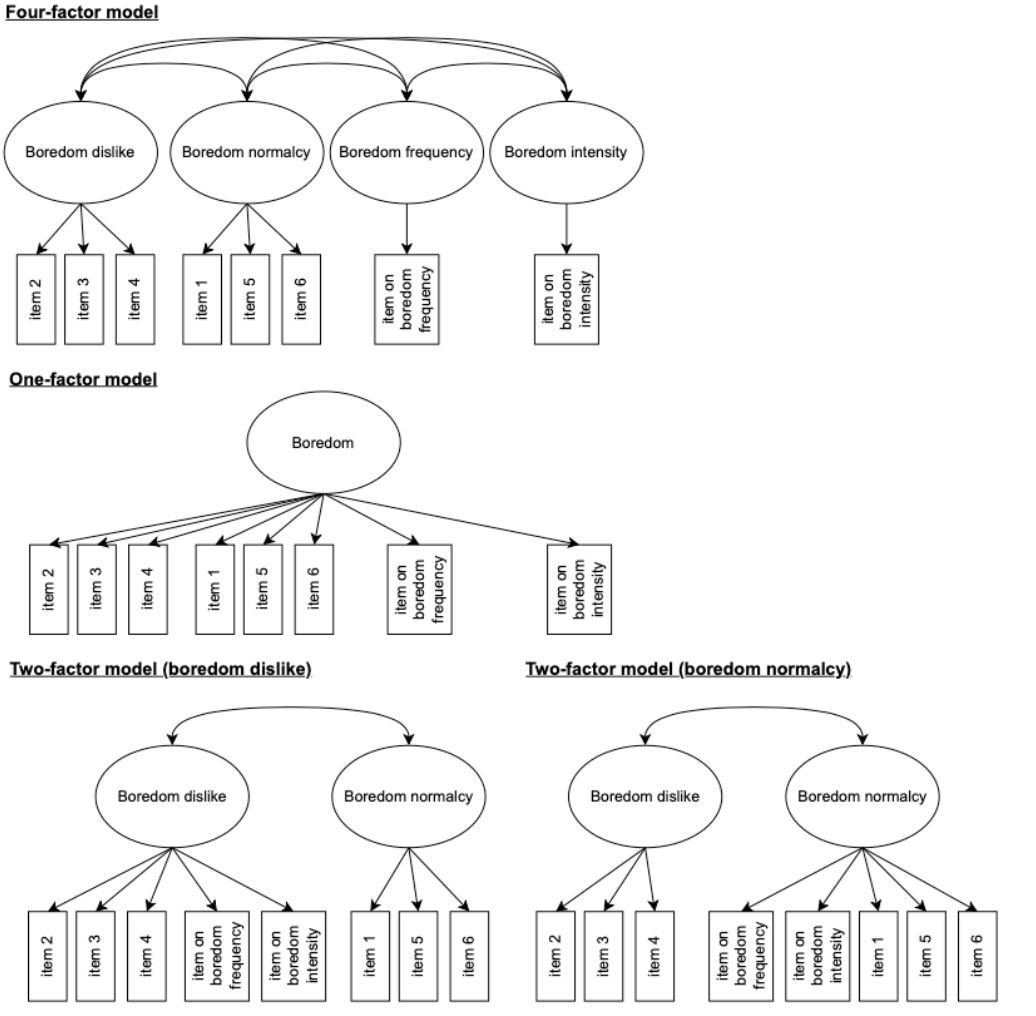
Data Analysis

We conducted factor analyses with four different models (see Figure C1 for the conceptual models), and compared these models to examine whether boredom beliefs can be measured distinctly from boredom frequency and intensity. CFAs with robust maximum likelihood estimator were conducted with the specifications of the following factor structures: (a) *Four-factor model* in which boredom dislike items, boredom normalcy items, boredom frequency item,

and boredom intensity item were loaded on four respective factors; (b) *One-factor model* in which all the items of boredom dislike, boredom normalcy, boredom frequency and boredom intensity were loaded on a single factor; (c) *Two-factor model (boredom dislike)* in which boredom dislike items, boredom frequency item and boredom intensity item were loaded on a factor, while boredom normalcy items loaded on another factor; (d) *Two-factor model (boredom normalcy)* in which boredom normalcy items, boredom frequency item and boredom intensity item were loaded on a factor, while boredom dislike items loaded on another.

Figure C1

Conceptual CFA Models



Results

Model fit indices from CFAs and results from chi-square difference test comparing the models that are nested are reported in Table C2 and Table C3. The four-factor model was shown to be the best-fitting model. These results suggest that boredom beliefs and boredom experience are psychometrically distinct.

Measurement Invariance

Data Analysis

We then conducted multigroup CFA to test the measurement invariance of the scale across age groups in Study 1. The total sample was split at the age of 18, which is the legal age of adulthood in the UK. This yielded an adolescent group (below the age of 18; n = 1,229) and an adult group (at or above the age of 18; n = 1,266). We examined a configural model, in which all parameters were freely estimated, to test whether the factor structure was significantly invariant across the two age groups (i.e., configural invariance model); we then estimated metric invariance by constraining factor loadings to be equal across the two groups, and we further tested scalar invariance by constraining the item intercepts to be equal. In stepwise approach, the metric invariance model was compared against the configural invariance model; the scalar invariance model was compared against the metric invariance model. If the change of CFI (ΔCFI) does not exceed .010 (Cheung & Rensvold, 2002) and the RMSEA value falls within the comparing model's RMSEA confidence intervals (Timmons, 2010), invariance is established.

Results

Table C4 presents the fit indices for the measurement invariance of the two-factor model. The fit of the configural invariance model was fair, $\chi^2(16)$ = 193.99, CFI = .940, RMSEA = .094, SRMR = .051. It suggests that the overall factor structure fits well across the two age groups. Constraining the factor loadings to be equal resulted in minor fit deterioration, with ΔCFI = .001 and RMSEA value falling within the RMSEA confidence intervals of the configural invariance model. Metric invariance was thus supported. Applying further restrictions with respect to the item intercepts, however, resulted in significant worsening in model fit, where ΔCFI = .041 and RMSEA value fall outside of the RMSEA confidence intervals of the metric invariance model. Scalar invariance was not supported. Following the suggestions by (Cheung & Rensvold, 2002), we investigated partial invariance by releasing item intercept constraints to one item

per latent constructs (items 1 & 2). We then compared the partially invariant model with metric invariant model, which showed that ΔCFI = .007 and RMSEA value fell within the RMSEA confidence intervals of the metric invariance model. Partial scalar invariance was found. Taken together, we found full configural invariance, full metric invariance and partial scalar invariance across the two age groups.

APPENDIX C

Table C2

Model Fit Indices

Model	Robust χ^2	Robust CFI	Robust TLI	Robust RMSEA [90 % *CI*]	SRMR
Four-factor model	200.61	.955	.921	.072 [.064, .081]	.051
One-factor model	1357.494	.656	.519	.178 [.170, .186]	.115
Two-factor model (boredom dislike)	725.575	.821	.736	.132 [.124, .140]	.077
Two-factor model (boredom normalcy)	1596.106	.603	.415	.196 [.188, .205]	.163

Note. CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; 90% *CI* = 90% confidence interval; SRMR = standardized root mean square residual.

Table C3

Chi-square Difference Test Between Models

Model	*df*	*AIC*	*BIC*	χ^2	$\Delta\chi^2$	Δdf	*p*
Four-factor model	16	75346	75463	227.07			
Two-factor model (boredom dislike)	19	75960	76059	847.01	456.98	3	< .001
Two-factor model (boredom normalcy)	19	76965	77064	1851.46	1004.45	0	
One-factor model	20	76719	76812	1607.62	-148.19	1	1

Table C4

Model Fit Indices for the Measurement Invariance Models of the Two Age Groups

					Difference tests				
Model	χ2	*df*	CFI	RMSEA [90% *CI*]	ΔCFI	ΔRMSEA	$\Delta\chi^2$	Δdf	*p*
Configural invariance	193.99	16	.940	.094 [.083, .107]					
Metric invariance	200.08	20	.939	.085 [.074, .096]	-.001[a]	-.009	6.09	4	.193
Scalar invariance	324.50	24	.898	.100 [.091, .110]	-.041[b]	.015	124.42	4	< .001
Partial scalar invariance	233.32	22	.932	.086 [.076, .096]	-.007[c]	.001	23.239	2	< .001

Note. df = degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; 90% *CI* = 90% confidence interval.

[a]Difference between configural and metric invariance models.

[b]Difference between metric and scalar invariance models.

[c]Difference between metric and partial scalar invariance models.

C.2 Testing the Between-person Associations of Boredom Beliefs, Boredom Experience, and Mental Well-being in Study 2

We examined the between-person associations of boredom beliefs, boredom experience, and mental well-being with Study 2's baseline data (N = 293). It should, however, be noted that this sample size afforded a power of .80 to for detecting effects sized r = .16, assuming a Type-I error rate of 5% (two-sided), according to sensitivity analysis. Based on the effect size of the interaction (β = -0.081) we found in Study 1, a minimum sample size of 1,199 participants, with power of .80, is needed to detect this effect with an alpha of .05.

To test Hypothesis 1, we examined the zero-order correlations between boredom dislike, boredom frequency and boredom intensity. For Hypothesis 2, we conducted regression analyses to examine whether mental well-being was predicted by boredom dislike (or boredom normalcy), boredom frequency (or boredom intensity), and their interaction terms.

Supporting Hypothesis 1, boredom dislike was positively associated with frequency (r = .19, p = .001; H1a) and intensity (r = .20, p < .001; H1b) of boredom. For Hypothesis 2, results of the regression analyses are presented in Table C5. Mental well-being was significantly associated with boredom frequency (or boredom intensity) but not with boredom dislike and their interaction term (H2a & H2b). These results are different from what we found in Study 1. This might be attributed to the differences in sample sizes (Study 1's N = 2,495, Study 2's N = 293), and thus reduced power in detecting the interaction. Moreover, regression analyses with mental well-being as the outcome variable revealed a negative main effect of boredom frequency (or boredom intensity) and a positive main effect of boredom normalcy; there was no significant interaction between boredom frequency (or boredom intensity) and boredom normalcy. These results replicate the findings from Study 1.

Table C5

Regression Models with Mental Well-being as Outcome Variable in Study 2's Baseline Data

Predictor	*B*	*SE*	β	*p*
Model with boredom dislike and boredom frequency				
Intercept	24.790	0.295		
Boredom dislike	-0.101	0.181	-0.033	.577
Boredom frequency	-0.562	0.128	-0.253	< .001
Boredom dislike × boredom frequency	-0.064	0.069	-0.053	.355
Adjusted R^2	0.059			
Model with boredom dislike and boredom intensity				
Intercept	24.745	0.301		
Boredom dislike	-0.122	0.183	-0.039	.507
Boredom intensity	-0.413	0.147	-0.166	.005
Boredom dislike × boredom intensity	-0.002	0.075	-0.001	.982
Adjusted R^2	0.022			
Model with boredom normalcy and boredom frequency				
Intercept	24.742	0.284		
Boredom normalcy	0.723	0.187	0.214	< .001
Boredom frequency	-0.576	0.123	-0.260	< .001
Boredom normalcy × boredom frequency	0.034	0.078	0.024	.660
Adjusted R^2	0.103			
Model with boredom normalcy and boredom intensity				
Intercept	24.749	0.290		
Boredom normalcy	0.681	0.191	0.202	< .001
Boredom intensity	-0.400	0.143	-0.161	.006
Boredom normalcy × boredom intensity	0.049	0.090	0.032	.585
Adjusted R^2	0.063			

Note. All predictors were centered.