



HAL
open science

Regulatory focus and self-determination motives interact to predict students' nutrition-habit intentions.

Fanny Lalot, Alain Quiamzade, Oulmann Zerhouni

► To cite this version:

Fanny Lalot, Alain Quiamzade, Oulmann Zerhouni. Regulatory focus and self-determination motives interact to predict students' nutrition-habit intentions.. *Journal of Experimental Psychology: Applied*, 2019, 25 (3), pp.477-490. 10.1037/xap0000196 . hal-04329010

HAL Id: hal-04329010

<https://hal.science/hal-04329010v1>

Submitted on 18 Feb 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Lalot, F., Quiamzade, A., & Zerhouni, O. (in press). Regulatory focus and self-determination motives interact to predict students' nutrition habit intentions. *Journal of Experimental Psychology: Applied*.

© 2018, American Psychological Association. This paper is not the copy of record and may not exactly replicate the final, authoritative version of the article. Please do not copy or cite without authors' permission. The final article will be available, upon publication, via its DOI: 10.1037/xap0000196

Regulatory focus and self-determination motives interact to predict students' nutrition habit intentions

Fanny Lalot¹²

Alain Quiamzade¹²

&

Oulmann Zerhouni³

¹ University of Geneva, Switzerland

² Distance Learning University of Switzerland, Switzerland

³ University Paris Nanterre, France

Author Note

Correspondence concerning this article should be addressed to Fanny Lalot (email: fanny.lalot@unige.ch, phone: +41223798725), University of Geneva, 40 boulevard du Pont d'Arve, 1205 Geneva, Switzerland.

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Abstract

Regulatory focus (Higgins, 1997) and self-determination (Deci & Ryan, 2000) are two motivation theories widely applied in health intervention research but never conjointly, despite sharing a number of theoretical similarities. In three studies ($N = 578$), we investigated how university students' self-determination motives to act upon their nutrition interact with induced regulatory focus and also regulatory message framing to predict their behaviour or intention to improve their eating habits. Results revealed a fit between extrinsic motives and prevention focus: intention increased with extrinsic motives in a prevention but not promotion focus. The effect of intrinsic motives, however, was independent of the focus, which suggests that these motives drive intention and behaviour independently of external cues. Hence, the results advocate for simultaneously taking into consideration self-determination and regulatory focus when planning a health intervention relying on motivation.

Keywords: self-determination; regulatory focus; extrinsic and intrinsic motives; health behaviour; nutrition

Public Significance Statement

This research suggests that an intervention aiming to improve people's nutrition will be more effective if framed in terms of "prevention" (i.e., insisting on bad things they could avoid by being vigilant towards their nutrition) and these persons mostly have external reasons to care about their health (e.g., because of social judgment). If people have internal reasons to care (e.g., they find it important and enjoy it), then the framing of the message does not seem to impact its efficacy.

Regulatory focus and self-determination motives interact to predict students' nutrition habit intentions

Poor and unbalanced nutrition rates are currently increasing in the Western societies according to health specialists. The whole population is concerned (World Health Organization, 2011), but some groups are more at risk than others. For example, it has recently been highlighted that university students were especially likely to develop and maintain an unhealthy diet (Racette, Deusinger, Strube, Highstein, & Deusinger, 2008; Vella-Zarb & Elgar, 2009). If these students benefit from a fair amount of knowledge about nutrition, they lack time and money to engage in a healthy lifestyle. Intervention programs have started tackling the issue but results are still limited (see Franko et al., 2008; Kelly, Mazzeo, & Bean, 2013; Milkman, 2018).

The success of an intervention relies on complex interactions between the individuals' characteristics and the context in which the intervention takes place, the intervention itself (style and content) being considered as a crucial element of the context. In this view, motivational states have a key role to play and have been investigated through two lenses. First, motivational states are taken into account as a chronic disposition that will determine a person's responsiveness to an intervention (e.g., Maes & Karoly, 2005). Second, the intervention itself can be designed so that it induces a specific motivational state, which, in turn, increase the intervention's effectiveness (e.g., Noar, Grant Harrington, Van Stee, & Shemanski Aldrich, 2010).

As such, two motivation theories have been widely applied to help create efficient messages and interventions: self-determination theory (Deci & Ryan, 2000) and regulatory focus theory (Higgins, 1997). They have, however, always been considered independently from one another but for one notable, purely theoretical exception. Meyer, Becker, and Vandenberghe (2004) present regulatory focus and self-determination as two parallel ways of

considering motivational states. They propose that both autonomous regulation and promotion focus will increase as a result of a greater salience of what they call “internal drives”, whereas controlled regulation and prevention focus will increase when “external demands” are made more salient (Meyer et al., 2004, p. 1000). We propose to extend the idea of a link between self-determination and regulatory focus one step forward by suggesting that they could interact and should therefore be considered together, rather than separately. The present paper proposes a first step towards the investigation of the combined effect of the person’s intrinsic and extrinsic motives to act upon their eating habits and the framing of the intervention message in terms of promotion versus prevention focus.

Self-Determination Theory and Applications

Two behavioural motives

Self-determination theory proposes that an intrinsic motivation arises when three basic psychological needs (i.e., autonomy, competence, and relatedness) are fulfilled; this intrinsic –or autonomous– motivation represents the pursuit of an activity because it is interesting, enjoyable, and challenging (Deci & Ryan, 1980, 2000, 2008). By opposition, extrinsic –or controlled– motivation represents the pursuit of an activity for more external reasons. Motivations are organised on a continuum of increasing self-determination (Deci & Ryan, 2000), from completely external (e.g., reward and punishment) to introjected (e.g., pride and shame) to identified (i.e., the behaviour is internalised but still pursued as a mean and not an end) to integrated (i.e., fully internalised). Individual differences in self-determination have been investigated in two different ways. The first is causality orientation, that is, one’s general motivational orientation in life (autonomous, controlled, or impersonal; Deci & Ryan, 1985). The second concerns one’s motives to pursue an action, which are labelled as intrinsic (e.g., affiliation, generativity, and personal development) versus extrinsic (e.g., wealth, fame, social approbation; Deci & Ryan, 2000; Kasser & Ryan, 1996).

Intrinsic and extrinsic motivation and health behaviour

Self-determination theory has been widely applied to health interventions (see Ng et al., 2012; Teixeira, Carraça, Markland, Silva, & Ryan, 2012, for reviews) with three main scopes. First, programs insisting on individuals' autonomous regulation yield better results, for example regarding weight loss amongst obese patients (Silva et al., 2010; Williams, Grow, Freedman, Ryan, & Deci, 1996). Second, individuals with a stronger autonomous orientation have more success in modifying their habits in the longer run (Deci & Ryan, 1980), for example in maintaining weight loss (Williams et al., 1996). Third, intrinsic motives have a positive effect on the adoption of health behaviour, notably regarding exercise and weight loss. Extrinsic motives, however, yield mixed findings (Teixeira et al., 2012), having sometimes a positive impact, sometimes no impact and, more rarely, a negative impact.

An explanation for those mixed findings could be that extrinsic motives need to be articulated with other elements to be effective. For example, their impact might depend on the nature of the task: extrinsic motivators such as rewards can increase task enjoyment and performance when the task is considered boring or aversive (Deci & Ryan, 1980). The task is still considered as a mean and not an end but commitment can be high nonetheless. Moreover, the same behaviour can be produced because of several coexisting reasons. For example, one can adopt a goal of exercising often because it is a mean to lose weight, to improve one's body-image, to maintain cardiac health, or because it provides an occasion to socialise in a sport club, or still because one enjoys exercising – or for any and all these reasons (Ingledeu, Markland, & Ferguson, 2009). This implies that motives do not exclude each other. As such, one could first engage in a behaviour for extrinsic motives and then learn to enjoy it and pursue it for more intrinsic motives. Accordingly, Teixeira et al. (2012) recommend avoiding denigrating a patient's motives even when those are extrinsic (see also Ingledeu & Markland, 2008).

Finally, some research suggests that interventions are more efficient when they fit to the individual's motives. Investigating safer sexual activity amongst adolescents, Sanderson and Cantor (1995) found that interventions focusing on communication skills were more efficient for adolescents who pursue social dating for intrinsic motives (here, intimacy goals), while interventions focusing on technical skills were more efficient for those endorsing extrinsic motives (here, identity goals). In the present paper, we aim to pursue this view and suggest that interventions framed in terms of promotion versus prevention (i.e., regulatory focus; Higgins, 1997) could be more or less effective depending on the person's intrinsic and extrinsic motives for action. In the next section, we briefly describe regulatory focus theory before exposing how it relates to self-determination.

Regulatory Focus Theory and Applications

Regulatory focus and regulatory fit theory

Regulatory focus theory (Higgins, 1997) distinguishes two independent motivational systems: A prevention focus arises from security needs and is related to "ought" goals (obligations and duties). It implies a particular attention to potential negative outcomes and a preference for vigilant means and strategies (Crowe & Higgins, 1997; Friedman & Förster, 2001). A promotion focus arises from nurturance needs and is related to ideal goals (hopes and aspirations). Attention is drawn to potential positive outcomes and eager means and strategies are favoured. Regulatory focus is a motivational disposition that can be reliably measured (e.g. Higgins et al., 2001; Lockwood, Jordan, & Kunda, 2002). Nonetheless, it can also be induced by contextual factors. For example, a person can intermittently focus on their current ideal versus ought goals, which would put them in a promotion versus prevention mind-set, respectively (see Freitas & Higgins, 2002; Guo & Spina, 2015). They can also be led to think about a particular issue in a given mind-set, i.e., a framing of the issue in terms of ideal versus obligation, safety versus growth, and gain versus loss (e.g., Falomir-Pichastor,

Mugny, Gabarrot, & Quiamzade, 2011). Message framing can similarly induce a promotion versus prevention mind-set (Cesario, Corker, & Jelinek, 2013).

A notion of regulatory fit was subsequently derived from regulatory focus theory (Higgins, 2000, 2005). Regulatory fit research proposes that a “feeling right” experience arises when there is a fit – or correspondence – between different aspects of the situation and the individual, which results in higher commitment, persuasion, behaviour change, and performance (Freitas & Higgins, 2002; Higgins, Idson, Freitas, Spiegel, & Molden, 2003; Plessner, Unkelbach, Memmert, Baltes, & Kolb, 2009). As such, perceived persuasiveness of a message and subsequent intention to act are higher when the person’s focus fits with the framing of a persuasion message (Cesario, Grant, & Higgins, 2004), as well as when the different aspects of the message fit one another (see Cesario et al., 2013; Cesario, Higgins, & Scholer, 2008; for reviews). Fit effects have also been identified between a promotion versus prevention framing and other situational elements, such as perceived risk (Lee & Aaker, 2004) and behavioural control (Haddad & Delhomme, 2006).

Regulatory focus and fit, and health behaviour

Literature suggests that promotion and prevention underpin different behaviours and can lead to both healthy and unhealthy conducts via different routes. For example, eating behaviour under a promotion (prevention) focus relies more on internal cues such as satiation (external cues such as social approbation; Florack, Palcu, & Friese, 2013). Neither this study nor numerous others yielded a main effect of the focus on behavioural outcomes (e.g., Avraham, Van Dijk, & Simon-Tuval, 2016; Berezowska, Fischer, & van Trijp, 2017; Cesario et al., 2004; for one exception showing an advantage of promotion focus, see Joireman, Shaffer, Balliet, & Strathman, 2012). In other words, health behaviours one ultimately adopts can be underpinned by different motivations, such as preventing illness versus promoting

health (Gomez, Borges, & Pechmann, 2013). Accordingly, most studies find a regulatory focus effect that is moderated by another factor, conceptualised as an effect of regulatory fit.

Individuals adopt more behaviours that are supposed to be beneficial for their health when the persuasion message fits with the person's focus: participants reported a greater intention to increase their fruits and vegetables intake when an eagerness (vigilance) message framing matched their promotion (prevention) focus (Cesario et al., 2004), and when the emphasis was put on benefits versus costs, respectively (Spiegel, Grant-Pillow, & Higgins, 2004). Similarly, intention to adhere to medical care regimens was higher amongst prevention-oriented patients when the message framing fit their orientation (Avraham et al., 2016). Regulatory focus also interacts with temporal distance of the highlighted health outcomes: a promotion focus increases intention and behaviour when distant outcomes are highlighted whereas a prevention focus proves more efficient when immediate outcomes are highlighted (Berezowska et al., 2017). Finally, promotion and prevention are differentially related to behavioural initiation and behavioural maintenance. Drawing from Rothman and colleagues' model (Rothman, 2000; Rothman, Baldwin, & Hertel, 2004), Fuglestad, Rothman, and Jeffery (2008) observed that promotion-oriented participants were more efficient in initiating behaviour change (quitting smoking and losing weight) whereas prevention-oriented participants were more efficient in maintaining their efforts in the long run. A promotion focus also predicted a more stable weight loss at two years amongst people who were far from their weight goal; conversely, a prevention focus proved more efficient amongst people who were close from their goal (Fuglestad, Rothman, Jeffery, & Sherwood, 2015; see also Bullard & Manchanda, 2015; Bullard & Manchanda, 2017).

A Fit between Regulatory Focus and Intrinsic-Extrinsic Motives

In sum, several investigations have identified a fit between regulatory focus and other contents in the health domain. However, to the best of our knowledge, no work has yet

studied such a fit with self-determination motives. We propose here that individuals' intrinsic and extrinsic motives for acting upon their health could fit with regulatory focus because they share a number of core constituents, and that such a fit potentially increases commitment to health-related behaviour. Indeed, past research has shown that the motives could make the individual more receptive to certain features of an intervention (Sanderson & Cantor, 1995). We propose that they could determine the persuasiveness of a message framed in promotion versus prevention terms. We investigate here, specifically, how the person's intrinsic and extrinsic motives interact with a message framing in terms of promotion versus prevention.

First, prevention focus and extrinsic motives share a preoccupation about obligations and ought, i.e., goals pursued because of a certain normative pressure and need for social acceptance. In this vein, an aforementioned study found people to rely more on cues of social approbation (i.e., an extrinsic motive) to regulate their eating behaviour under a prevention focus (Florack et al., 2013). Similarly, discrepancies between the actual and the "ought" self (Higgins, 1987) result in emotions of shame and guilt as well as fear of punishment – all features that correspond to extrinsic motives for action. Deci and Ryan themselves wrote that, in their view, "the 'ought self' is a set of introjected values or standards that can affect the self and motivate behaviour but is not the basis for self-determined action" (Deci & Ryan, 2000, p. 248). From such similarities, one can expect a fit when the person holds strong extrinsic motives and the intervention or the message adopts a prevention, rather than promotion, framing. As they are per definition externally driven, extrinsic motives should be highly sensitive to contextual changes; as a result, the person's commitment would greatly depend on the situation of fit versus non-fit, as a function of the message framing. Hence, when there is a fit, one would expect that the higher the extrinsic motives, the higher the commitment towards healthier behaviours – while no such result would appear when there is a non-fit.

Second, promotion and intrinsic motives both relate to a need for personal development (“nurturance” or “growth”) and as such, they imply the pursuit of an ideal. Indeed, the “ideal” self (Higgins, 1987) is an integrated self-schema that relies on the person’s internal values as self-guides and, as such, would underlie autonomous motivation (Deci & Ryan, 2000). Promotion-related emotions (i.e., cheerfulness and dejection) similarly refer to an intrapersonal rather than interpersonal (or external) perspective (Higgins, Shah, & Friedman, 1997). In direct relation with health, individuals in a promotion focus were also found to rely more on internal cues (e.g., satiation) to regulate their eating behaviour (Florack et al., 2013). As such, one could expect a fit when the person holds strong intrinsic motives and the intervention or message adopts a promotion, rather than prevention, framing.

However, intrinsic motives are, per definition, an internal drive to behaviour. As such, they might be less sensitive, or not at all, to external cues. The promotion-prevention framing being such a contextual cue, it could be of lesser importance in predicting subsequent commitment when intrinsic motives are prevailing. In other words, intrinsic motives are more independent from the context; hence, changing the context and implementing a fit versus non-fit situation could induce less change, if not at all, compared to extrinsic motives. Thus, the prediction for intrinsic motives is not straightforwardly symmetrical to the one for extrinsic motives. In the former case, we would expect the fit versus non-fit situation to have a weaker or even no effect on commitment.

Overview of the studies

We present three studies in which participants’ motives to act upon their nutrition were assessed, and regulatory focus was manipulated either as a general mind-set (Study 1), the framing of an intervention message (Study 2) or a specific mind-set regarding nutrition (Study 3). Dependent variables included personal behavioural intention (Study 1), willingness to participate in an online health program (Study 2) and information-seeking behaviour (Study

3). The research was approved by the ethics committee of the first author's university. All measures and manipulations included in the studies are reported.

Study 1

Method

Participants. University students were contacted by email to participate in an online study about students' nutrition habits. We determined the required sample size through an a priori power analysis (Faul, Erdfelder, Lang, & Buchner, 2007). For this first study we assumed a small-to-medium effect size (Cohen's $d = .42$). The analysis recommended a minimal N of 180 to ensure 80% power for our design. A total of 188 participants, amongst which 56 men and 132 women, completed the study (average age = 24.4, $SD = 6.12$). They were randomly assigned to one condition of regulatory focus (promotion: $N = 94$, prevention: $N = 94$).

Independent variables

Intrinsic and extrinsic motives. Drawing from the literature (Deci & Ryan, 2000; Osbaldiston & Sheldon, 2003; Taberero & Hernández, 2011), we first measured participants' intrinsic and extrinsic motives to act upon their eating habits through four items, two for each motivation (7-point scale, 1 = not at all, 7 = very much). We conducted an exploratory factorial analysis on the four items. As intrinsic and extrinsic motives are not fully independent but can, instead, correlate, we use an oblique rotation (i.e., Oblimin method; Abdi, 2003), which revealed two independent factors corresponding to intrinsic and extrinsic motives, accounting for 76% of variance (interfactor correlation: $r(186) = -.01$, $p = .93$). Hence, we computed separate scores of intrinsic and extrinsic motives. Items, loadings, and descriptive statistics are reported in Table 1.

Table 1

Loadings of the items measuring participants' intrinsic and extrinsic motives in Studies 1 to 3.

An exploratory factorial analysis with Oblimin rotation was conducted for each study.

Descriptive statistics and interfactor correlations are also reported.

Item	Study 1		Study 2		Study 3	
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
	<i>Intrinsic</i>	<i>Extrinsic</i>	<i>Intrinsic</i>	<i>Extrinsic</i>	<i>Intrinsic</i>	<i>Extrinsic</i>
...because it is interesting and enjoyable to do it	.91		.91		.91	
...because it is important and worthwhile to me	.91		.87		.87	
...because I enjoy doing it	n/a		.94		.93	
...because I feel like I have to do it		.83		.78		.81
...because I gain social acceptance through it		.82		.78		.82
...because I have the possibility to gain something (or avoid to lose something)		n/a		.68		.52
<i>M (SD)</i>	5.05 (1.72)	2.32 (1.40)	4.74 (1.57)	2.74 (1.32)	4.89 (1.57)	2.74 (1.33)
Interfactor correlation	$r = -.01^{ns}$		$r = .10^{ns}$		$r = .00^{ns}$	

In this study as well as the two following ones, we also assessed participants' current eating habits (e.g., consumption of sweets, calorific food, alcohol, coffee, fruits and vegetables, red and white meat). The variable, however, did not interact with the independent variables nor did it change the effects when entered as covariable in the statistical models. Hence, we do not discuss it. Additional analyses can be obtained upon request from the corresponding author.

Regulatory focus induction. We induced regulatory focus through the “current ideals or ought procedure” described by Freitas and Higgins (2002; see also Guo & Spina, 2015). Depending on the experimental promotion (vs. prevention) condition, participants read, “We

will now ask you to perform a mental visualization task. Please think about something you ideally would like to do (you think you ought to do). In other words, please think about the hopes or aspirations (duties or obligations) that you currently have. Please spend at least 2 or 3 minutes to think about these hopes or aspirations (duties or obligations) as this is very important for the study.” Participants reported in an open field what their ought or ideal was. The questionnaire was designed so that it was not possible to continue to the next page before at least 45 seconds had elapsed. Participants spent an average of 153 seconds ($SD = 262$) on the task.

Dependent measure: personal behavioural intention. Finally, participants rated their intention to act upon their nutrition habits. Specifically, three questions asked: “Regarding your personal nutrition, to what extent do you think (1) you should put in more efforts; (2) you ideally would like to put in more efforts; (3) you intend to put in more efforts?” (7-point scale, 1 = not at all, 7 = very much). The nuances were introduced to ensure the items would not correspond to one focus more than the other. Answers loaded on a single factor and were aggregated ($\alpha = .90$, $M = 4.50$, $SD = 1.87$).

Results

Regulatory focus (-1 = prevention, +1 = promotion), intrinsic motives (standardised), extrinsic motives (standardised) and all the interactions were entered as predictors in a linear model with personal behavioural intention as the dependent variable (overall model: $F(7,180) = 2.42$, $p = .022$, $R^2_{adj} = .05$). The analysis revealed a main effect of extrinsic motives, $b = .35$, 95% CI [.08, .62], $t(180) = 2.55$, $p = .012$, $\eta^2_p = .035$, so that stronger extrinsic motives predicted higher personal intention. Moreover, the expected regulatory focus \times extrinsic motives interaction was also significant, $b = -.32$, 95% CI [-.59, -.05], $t(180) = -2.36$, $p = .019$, $\eta^2_p = .030$. Decompositions showed that the simple effect of extrinsic motivation was positive and significant in the prevention condition, $b = .68$, 95% CI [.31, 1.04], $t(180) = 3.66$, $p <$

.001; but nonsignificant in the promotion condition, $b = .05$, 95% CI [-.33, .43], $t(180) = 0.28$, $p = .78$ (see Figure 1). No other effect was significant. Importantly, intrinsic motives produced neither a main effect, $b = -.21$, 95% CI [-.47, .07], $t(180) = -1.48$, $p = .14$, $\eta^2_p = .012$, nor an interaction with regulatory focus, $b = -.08$, 95% CI [-.35, .19], $t(180) = -0.57$, $p = .57$, $\eta^2_p = .002$.

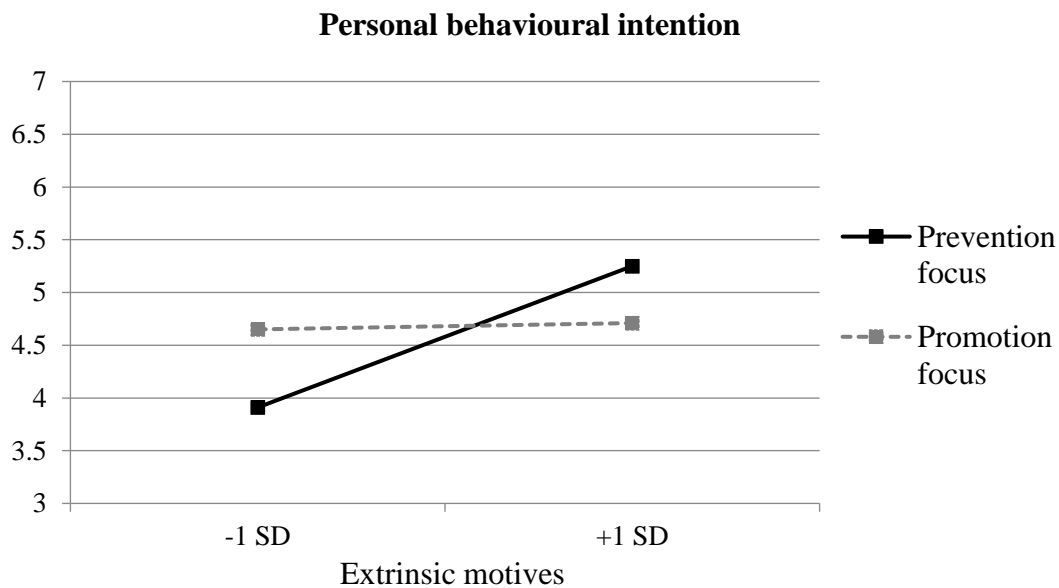


Figure 1. Personal intention to act upon one's eating habits as a function of extrinsic motives and regulatory focus in Study 1.

Discussion

A first study tested the idea that motives interact with regulatory focus to predict personal intention to improve eating habits. As expected, prevention focus fit with extrinsic motives: the stronger the extrinsic motives, the higher the intention to act, in the prevention condition. In the promotion condition, intention was independent from extrinsic motives. Regarding intrinsic motives, results –with all caution related to interpreting null findings– seem to support the idea that intrinsic motives drive behaviour independently from contextual cues, in this case from the regulatory focus mind-set manipulation; hence, a fit does not lead to any benefit compare to a non-fit for those motives.

Two limitations of this first study must be noted. First, the regulatory focus induction corresponded to a general focus that was not directly related to nutrition. Second, the dependent variable was limited to a rather abstract personal intention to put in more efforts regarding one's nutrition. To address these limitations, a second study adopted a more ecological design where regulatory focus was induced through the framing of a text depicting the issues of an unhealthy diet amongst students, and where the dependent measure assessed participants' willingness to commit to an online health program in relation to this text.

Study 2

Method

Participants. As in the previous study, participants were university students recruited by email to participate in an online study. A total of 177 participants completed the study, which fulfils the same statistical power requirements as Study 1. They were 60 men and 117 women of an average age of 23.1 ($SD = 4.31$). Participants were randomly assigned to one regulatory focus condition (prevention: $N = 91$, promotion: $N = 86$).

Independent variables

Measures of intrinsic and extrinsic motives. Again, we started by assessing participants' intrinsic and extrinsic motives. To increase validity, we added two items to the initial set of four used in the previous study. An exploratory factorial analysis with Oblimin rotation revealed two independent factors corresponding to intrinsic and extrinsic motives, and accounting for 70% of variance (interfactor correlation $r(175) = .10$, $p = .19$), and we accordingly created separate composite scores of intrinsic and extrinsic motives (see Table 1).

Regulatory focus manipulation. After these measures, we presented participants with a one-page newspaper-like article on the topic of students' nutrition. The article described the current situation of unhealthy dieting amongst students, identified responsible factors (i.e., lack of time and money and high levels of daily stress) and reported on an intervention

program that aimed to rectify the situation, with preliminary positive results. Two versions of the article were created in order to induce a prevention or a promotion focus including, respectively, a loss- versus gain-framing, vigilance versus eagerness strategies, and focus-specific emotions. Core differences are reported in Table 2, and full texts are included in a supplementary material appendix in the original language (Appendix I). Participants spent an average of 87 seconds reading the text ($SD = 101$, Median = 66). Reading time was not function of the text framing, $F(1,175) = 0.23$, $p = .64$ (prevention: $M = 83.5$, $SD = 91.4$; promotion: $M = 90.7$, $SD = 109.9$).

Table 2

Core elements of the message manipulation in Study 2 inducing a promotion versus prevention focus.

Text element	Promotion focus condition	Prevention focus condition
Title	How to eat healthy as a student?	How to avoid eating unhealthy as a student?
Gain- / loss-frame	Students miss an opportunity to develop healthy eating habits that could likely perpetuate and create a ground for good health in the future.	Students develop unhealthy eating habits that could likely perpetuate and create a ground for chronic illness in the future.
Approach / avoidance strategies	Time management strategies to free up time and enjoy a meal	Time management strategies to free up time and avoid missing a meal
	Tips to find healthy <i>and</i> cheap food	Tips to avoid unhealthy food <i>and</i> avoid spending too much money
Focus-related emotions	Emotion regulation strategies to increase well-being	Emotion regulation strategies to decrease stress
	First results are encouraging: students report lower feeling of discouragement and more satisfaction.	First results are reassuring: students report higher feeling of relaxation and less tension.
Conclusion	Let's hope these programs now spread!	These programs must now spread!

Dependent measure: willingness to participate to a nutrition program. After the reading, participants indicated to what extent they would be willing to participate in a program such as described in the article if it were implemented in their university. We drew from the collective action literature (Zaal, Van Laar, Ståhl, Ellemers, & Derks, 2012) to create four items: “To what extent would you (1) sign a petition supporting this program; (2) subscribe to a newsletter; (3) become a support member; (4) personally participate in the program?” (7-point scale, 1 = not at all, 7 = very much). Answers loaded on a single factor in an exploratory factorial analysis and were aggregated ($\alpha = .80$, $M = 3.63$, $SD = 1.47$).ⁱ

Results

Willingness to participate in the program was regressed on regulatory focus (-1 = prevention, +1 = promotion), intrinsic and extrinsic motives (both standardised) and all interactions (overall model: $F(7,169) = 6.25$, $p < .001$, $R^2_{adj} = .17$). The model yielded a main effect of both intrinsic, $b = .52$, 95% CI [.31, .73], $t(169) = 4.97$, $p < .001$, $\eta^2_p = .13$, and extrinsic motives, $b = .29$, 95% CI [.09, .49], $t(169) = 2.85$, $p = .005$, $\eta^2_p = .046$, revealing positive relations with willingness to participate in both cases. The expected regulatory focus \times extrinsic motives fell just short of significance, $b = -.19$, 95% CI [-.39, .01], $t(169) = -1.90$, $p = .060$, $\eta^2_p = .021$. Despite its marginal nature, we decomposed the interaction with respect to our hypothesis. The extrinsic motives slope was strongly significant in the prevention, $b = .52$, 95% CI [.23, .80], $t(169) = 3.57$, $p < .001$, but nonsignificant the promotion condition, $b = .15$, 95% CI [-.16, .47], $t(169) = 0.97$, $p = .33$ (see Figure 2). No other effect reach significance, $t_s < 1.47$, $p_s > .14$. Importantly and consistent with the first study, the regulatory focus \times intrinsic motives was not significant, $b = -.01$, 95% CI [-.22, .19], $t(169) = -0.12$, $p = .91$, $\eta^2_p < .001$.

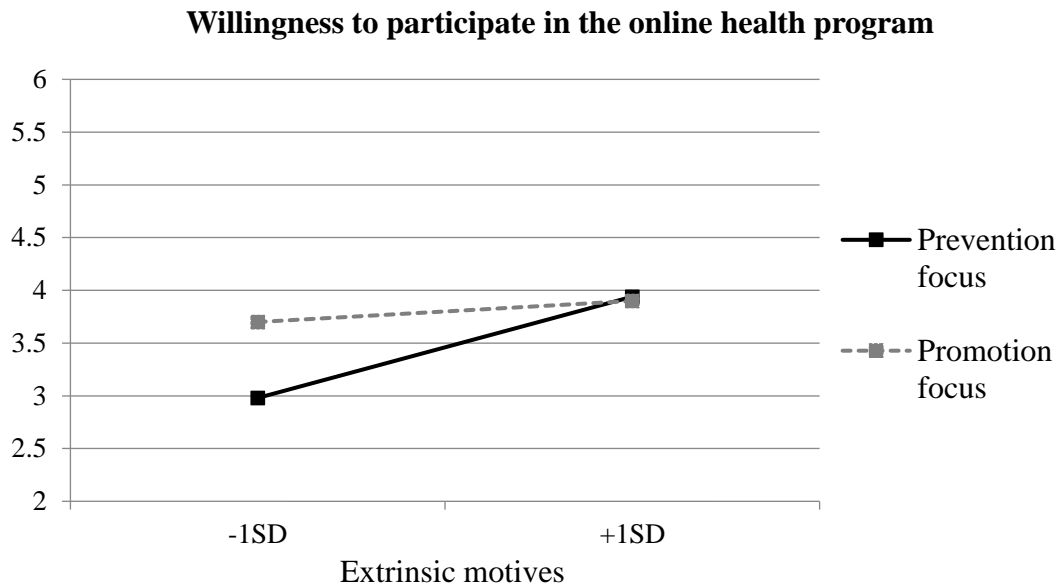


Figure 2. Participants' willingness to participate in an online health program as a function of extrinsic motives and regulatory focus in Study 2 (7-point scale).

Discussion

This second study replicated the interaction effect found in Study 1 with a different regulatory focus induction as well as a different dependent variable. This more ecological manipulation of regulatory focus increases the findings' reliability and suggests intervention directions for creating efficient messages. Although in this study the moderation effect fell just short of significance, simple effects indicated a fit effect between extrinsic motives and prevention focus: willingness to act increased with extrinsic motives in the prevention condition only. Consistent with the first study, intrinsic motives were independent from the focus, supporting the hypothesis that they drive behaviour regardless of external cues.

Before concluding, we conducted a third study in order to strengthen our results and answer a few remaining questions. In this last study we utilised yet another regulatory focus induction, manipulating participants' conception of nutrition in promotion versus prevention terms. We also moved to a more behavioural dependent measure. Indeed, it is important to

ensure that the effects found on behavioural intention replicate on actual behaviour. Hence, in this study we used a measure of information-seeking behaviour.

Study 3

Method

Participants. As in previous studies, participants were university students recruited by email to participate in an online study. Because we suspected that the previous study might have been underpowered, we recruited a larger number of participants than in the previous studies. A total of 213 participants, amongst which 71 men and 142 women (average age = 23.4, $SD = 6.07$), completed the study. Participants were randomly assigned to one condition of regulatory focus (prevention: $N = 105$, promotion: $N = 108$).

Independent variables

Measures of intrinsic and extrinsic motives. We used the same six items as in Study 2 to assess participants' intrinsic and extrinsic motives. Consistent with previous findings, items loaded on two separate factors (accounting for 70% of variance) independent from one another, $r(212) < .001$, $p = .99$, allowing to create separate scores of intrinsic and extrinsic motives (see Table 1).

Regulatory focus manipulation. The manipulation aimed to put participants in a specific mind-set (see Falomir-Pichastor et al., 2011; study 3). Participants were instructed to think about the value of personal health and more specifically of a healthy diet. They answered three short tasks that englobed the different components of regulatory focus, namely, type of goal, type of strategy, valence of the outcomes, and focus-related emotions. Specifically and depending on the experimental condition, participants indicated to what extent maintaining their personal health represented a personal ideal (obligation), an aspiration (ought) and a goal to attain (a requirement to respect). Second, they described two strategies allowing to promote a healthy diet (prevent an unhealthy diet) as well as the two

main consequences ensuing from a healthy diet (the avoidance of an unhealthy diet), according to them. Finally, they reported to what extent they would feel a set of emotions when adopting a healthy behaviour (avoiding an unhealthy behaviour; see Shah & Higgins, 2001) or not.

Dependent measure: information-seeking behaviour. After the manipulation, we indicated that the National Society of Nutrition (NSN) had launched a website offering nutrition tips as well as different tests (e.g., BMI and calories intake calculator). Participants indicated whether they wished to be redirected to this website at the end of the study, or not. This binary response formed an index of information-seeking behaviour. Overall, 61% of participants asked to be redirected to the NSN website.

Results

Regulatory focus (-1 = prevention, +1 = promotion), intrinsic and extrinsic motives (standardised) and all interactions were entered in a binary logistic regression with information-seeking as the dependent variable (0 = no wish to seek information, 1 = information seeking); overall model evaluation: $\chi^2(7) = 154, p = .031$; Hosmer and Lemeshow goodness-of-fit test: $\chi^2(8) = 12.7, p = .12$; Cox and Snell $R^2 = .07$. The analysis revealed a main effect of both intrinsic, $B = .31 (SE = .15)$, Wald's $\chi^2(1) = 4.14, p = .042$, and extrinsic motives, $B = .34 (SE = .16)$, Wald's $\chi^2(1) = 4.36, p = .037$ – positively predicting information seeking in both cases. The expected regulatory focus \times extrinsic motives was also significant, $B = -.34 (SE = .16)$, Wald's $\chi^2(1) = 4.34, p = .037$. The logistic curve for extrinsic motives was positive and significant in the prevention condition, $B = .62 (SE = .25)$, Wald's $\chi^2(1) = 6.20, p = .013$, but nonsignificant in the promotion condition, $B = .07 (SE = .19)$, Wald's $\chi^2(1) = 0.14, p = .71$ (see Figure 3). No other effect was significant, Wald's $\chi^2(1) < 2.63, p > .11$, including the intrinsic motives \times regulatory focus interaction, $B = .02 (SE = .16)$, Wald's $\chi^2(1) = 0.01, p = .92$.

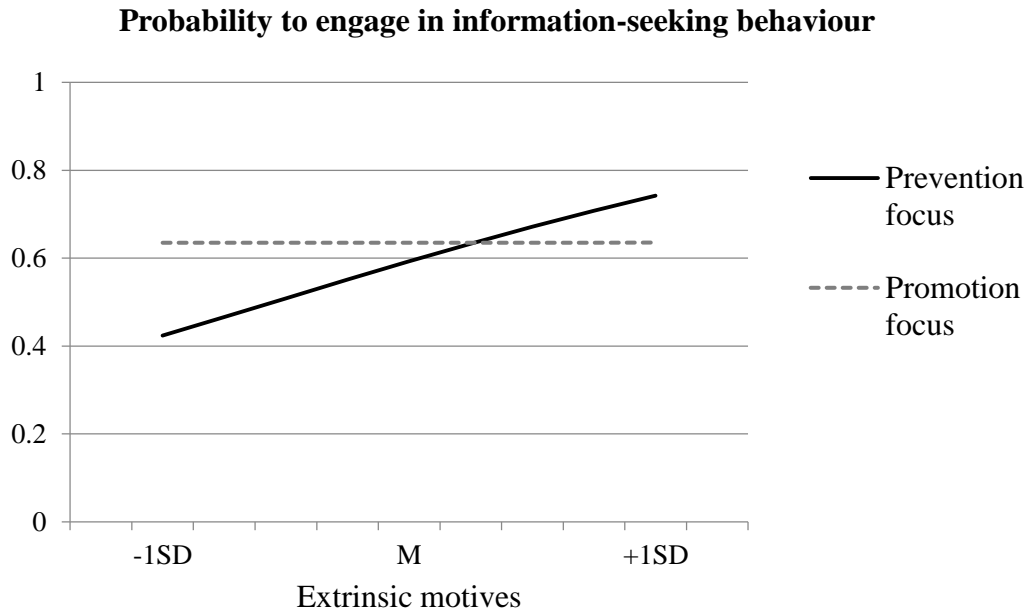


Figure 3. Probability to engage in information-seeking behaviour as a function of extrinsic motives and regulatory focus in Study 3.

Discussion

A third study replicated our findings, showing that probability to seek health-related information increased with extrinsic motives in the prevention, but not promotion focus condition. As observed before, the effect of intrinsic motives was independent from the focus. The present results strengthened the previous ones by ensuring that the effects replicated on a behavioural measure, beyond simple intention.

Small-Scale Meta-Analysis

Globally, findings of the three studies were consistent. However, the interaction term failed to reach significance in the second study. To better estimate the reliability of our findings and following recommendations from Braver, Thoemmes, and Rosenthal (2014), we hence conducted a small-scale meta-analysis including the findings of all three studies.

We separately considered the intrinsic motives \times regulators focus and extrinsic motives \times regulatory focus interaction terms. Given its common use in meta-analyses, we chose Cohen's d as the effect size indicator. Using R, we computed Cohen's d for each effect

(compute.es package; Del Re, 2013), then ran a random-effect model with the Sidik-Jonkman method on the data (metafor package; Viechtbauer, 2010). Detailed results are reported in Table 3 and Figure 4. The analysis revealed a significant and homogenous extrinsic motives by regulatory focus interaction effect, $d = -0.31$ $[-1.15, -0.47]$, $z = -3.76$, $p < .001$, $Q(2) = .08$, ns. The intrinsic motives by regulatory focus interaction effect, for its part, was homogeneously nonsignificant, $d = -0.04$, 95% CI $[-0.20, 0.12]$, $z = -0.45$, ns., $Q(2) = .14$, ns.

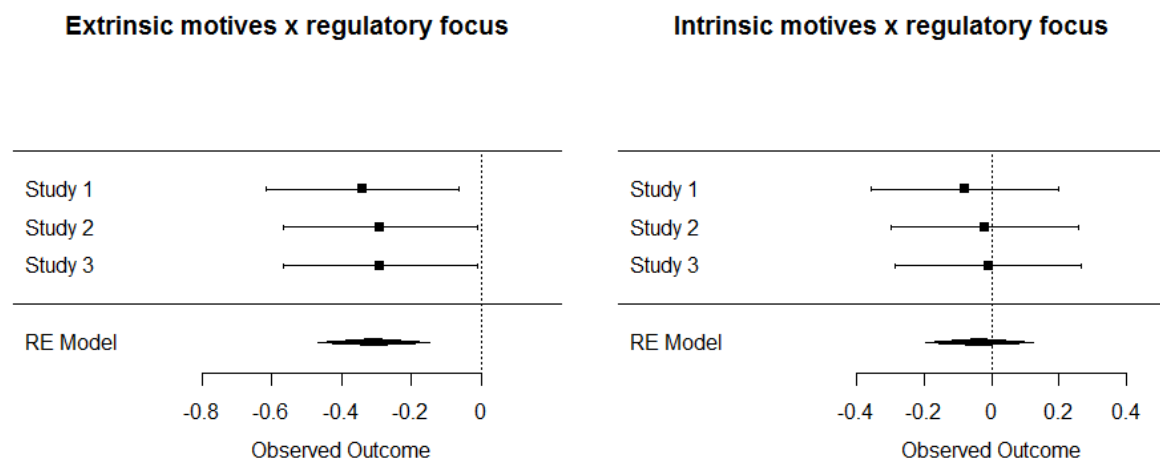


Figure 4. Observed Cohen's d and 95% confidence intervals for the two motives \times regulatory focus interaction terms in the three studies and the related meta-analyses.

Table 3

Small-scale meta-analysis of the findings of the three studies.

Study	<i>N</i>	Extrinsic motives × regulatory focus			Intrinsic motives × regulatory focus		
		Statistic	<i>d</i>	95% CI	Statistic	<i>d</i>	95% CI
1	188	$t = -2.36$	-0.34	[-0.62, -0.06]	$t = -0.57$	-0.08	[-0.36, 0.20]
2	177	$t = -1.90$	-0.29	[-0.57, -0.01]	$t = -0.12$	-0.02	[-0.30, 0.26]
3	213	$\chi^2 = 4.34$	0.29	[-0.57, -0.01]	$\chi^2 = 0.01$	0.01	[-0.29, 0.27]
		<i>z</i>	<i>d</i> and 95% CI	<i>SE</i>	<i>z</i>	<i>d</i> and 95% CI	<i>SE</i>
Meta-effect		-3.76***	-0.31 [-0.47, -0.15]	.08	-0.45 ^{ns}	-0.04 [-0.20, 0.12]	.08
Homogeneity		$I^2 = 0.11\%$	$Q(2) = .08, p = .96$		$I^2 = 0.33\%$	$Q(2) = .14, p = .93$	

*** $p < .001$

General Discussion

The present paper aimed to bring together two traditions that are widely represented in health psychology and intervention research but surprisingly always considered separately, that is, regulatory focus theory (Higgins, 1997) and self-determination theory (Deci & Ryan, 1980, 2000). We proposed here that promotion versus prevention focus and intrinsic versus extrinsic motives, respectively, share a number of core components that allow to expect them to fit with each other. In three studies, we tested how university student's intrinsic and extrinsic motives to act upon their nutrition interacted with a regulatory focus framing to predict intention to improve their eating habits. To increase validity, we relied on three different regulatory focus inductions, ranging from a general mind-set induction (Study 1) to a more specific nutrition-related mind-set induction (Study 3), as well as the framing of an intervention message (Study 2). We considered different outcomes under the form of personal intention to act upon one's health (Study 1), willingness to participate in an online health program (Study 2), and information-seeking behaviour (Study 3).

First, it is worth noting that intrinsic and extrinsic motives did not correlate with each other in any of the studies. This supports the idea that one person can hold different motives that coexist and together drive behaviour (see Ingledeu & Markland, 2008; Ingledeu et al., 2009; Teixeira et al., 2012, for similar considerations). Moreover, regulatory focus framing per se did not produce any main effect, which is congruent with a large body of literature showing that the regulatory focus effects are seldom direct but most often moderated by another factor (e.g., Avraham et al., 2016; Berezowska et al., 2017; Florack et al., 2013).

Indeed, and more interestingly, results revealed that reaction to a prevention focus framing was a function of the participants' extrinsic motives: this framing worked best for participants who reported higher extrinsic motives to act upon their nutrition habits and resulted in higher personal intention to act, willingness to participate in an online program as

well as interest for nutrition-related information (i.e., the fit hypothesis). Regarding intrinsic motives, it was more difficult to draw a clear prediction. On the one hand, a fit hypothesis leads to predict an interaction with the contextual regulatory focus framing. On the other hand, these motives rely by definition on an internal drive towards action, which leads to expect a reduced or even null impact of the context. Results support this latter possibility by consistently showing no interaction between intrinsic motives and regulatory focus. Caution is of course necessary when interpreting nonsignificant results. Nonetheless, the meta-analysis suggested that this effect was reliably and homogeneously null. This highlights an interesting distinction between extrinsic and intrinsic motives, which cannot simply be considered as opposite, mirroring motivations. Instead, it seems that the context and, hence, the features of any intervention, are more important when a person holds extrinsic than intrinsic motives to act. The present results have practical implications with respect to message framing in health interventions. First, if assessing beforehand – or having prior knowledge of – the intrinsic-extrinsic motives of the population of interest, one should aim to frame persuasive messages in terms that fit the persons' motives, especially if those are extrinsic (see e.g., Baker et al., 2015; Beck et al., 2010; for considerations on tailored interventions). Second, if one does not have access to the population's motives, our results seem to suggest that a prevention framing is the safer bet: it increases commitment of extrinsically motivated individuals while *not decreasing* that of the intrinsically motivated.

Limitations and future directions

Within the scope of providing experimental results that would inform intervention research, we limited our investigation to a specific question. Importantly, we systematically used self-determination theory to represent individual differences, that is, intrinsic and extrinsic motives, and regulatory focus theory to represent (induced) contextual cues.

However, both theories are rich in nuances and can be considered at the individual as well as

the contextual level. Indeed, the fact that our results revealed only a half-fit (i.e., fit between prevention and extrinsic motives, but no relation with promotion and intrinsic motives) largely depends on our paradigm in which intrinsic motives, being measured, represent the person's tendency to act for internal reasons independently of the context, as discussed above. These results do not rule out, however, that promotion and intrinsic motives could otherwise lead to better outcomes than a non-fit. First, they could naturally coexist, which means that promotion-oriented individuals would tend to hold more intrinsic motives in general. Second, reversing the role of the constructs, one could find that promotion- versus prevention-oriented individuals react more favourably to health interventions insisting on autonomy versus control, or stressing the low versus high (social) benefits of a health-related activity, specifically; in this case a complete and symmetrical fit effect could be observed, as promotion and prevention should be comparably sensitive to the context. Finally, these factors could interact when both manipulated as contextual features, that is, an intervention might be more efficient when it both insists on autonomy and relies on typical promotion features (i.e., importance of positive outcomes, eagerness strategies, ideal goals) or when it insists on control and relies on prevention features (i.e., negative outcomes, vigilance strategies, ought goals). Future research will need to investigate these different possibilities.

Moreover, in the present set of studies we relied on a simple distinction between intrinsic and extrinsic motives, which is not uncommon in empirical research (e.g., Osbaldiston & Sheldon, 2003; Tabernero & Hernández, 2011). Self-determination theory, however, distinguishes different levels of extrinsic motives (Deci & Ryan, 2000). As such, extremely external motives such as rewards/punishments are not completely similar to introjected (pride and shame) or even identified motives (behaviour pursued as a mean), and they could differently fit with the prevention focus. Indeed, prevention is related to the "ought self" (Higgins, 1987), which, despite focusing on obligations and potential punishments, still

constitutes an inner guide to behaviour. We would imagine that the intermediate level of introjected motives could be the best suitable candidate to correspond to the prevention focus. Our studies, however, were not designed to test such a possibility. Future research will need to measure more precisely the motives along the self-determination continuum in order to disentangle between competing external motives and identify the “sweet spot” fitting with a prevention mind-set.

As another limitation, one will note that we studied here a specific population (i.e., university students) and a specific health domain (i.e., nutrition). We would expect our results to replicate on different populations and different domains and future studies will need to assure this. More importantly, literature on message framing and health has shown that the topic under investigation could be of importance, notably when considering detection versus prevention behaviour (e.g., Rothman, Bartels, Wlaschin, & Salovey, 2006; Rothman & Salovey, 1997). In one study comparing three persuasive messages promoting physical activity framed in terms of loss vs. gain vs. mixed, Latimer et al. (2008) found an advantage of the gain-framed message over the two others, but only in the longer run (i.e., a difference appeared at 9 but not 2-week follow-up). As such, future studies will need to ensure that the interactive effect of motives and regulatory focus holds for other health concerns including those involving higher risk, and over a longer time span.

Finally, our proposition to simultaneously take into account self-determination and regulatory focus is not solely confined to health issues. Similar interactions can be expected in a variety of other domains where a fit was found to occur, as for example pro-environmental behaviour (Bertolotti & Catellani, 2014) or social collective action (Zaal et al., 2012). Future research should investigate this possibility and extend knowledge of the articulation of these different motivations, a proposition that exceeds the scope of the present article.

References

- Abdi, H. (2003). Factor Rotations in Factor Analyses. *Encyclopedia of Social Sciences Research Methods*, 1-8.
- Avraham, R., Van Dijk, D., & Simon-Tuval, T. (2016). Regulatory focus and adherence to self-care behaviors among adults with type 2 diabetes. *Psychology, Health & Medicine*, 21(6), 696-706. <http://dx.doi.org/10.1080/13548506.2015.1112413>
- Baker, R., Camosso-Stefinovic, J., Gillies, C., Shaw, E. J., Cheater, F., Flottorp, S., . . . Jager, C. (2015). Tailored interventions to address determinants of practice. *Cochrane Database Syst Rev*(4), Cd005470. <http://dx.doi.org/10.1002/14651858.CD005470.pub3>
- Beck, C., McSweeney, J. C., Richards, K. C., Roberson, P. K., Tsai, P.-F., & Souder, E. (2010). Challenges in Tailored Intervention Research. *Nursing outlook*, 58(2), 104-110. <http://dx.doi.org/10.1016/j.outlook.2009.10.004>
- Berezowska, A., Fischer, A. R. H., & van Trijp, H. C. M. (2017). The interplay between regulatory focus and temporal distance in the health context. *British Journal of Health Psychology*. <http://dx.doi.org/10.1111/bjhp.12272>
- Bertolotti, M., & Catellani, P. (2014). Effects of message framing in policy communication on climate change. *European Journal of Social Psychology*, 44(5), 474-486. <http://dx.doi.org/10.1002/ejsp.2033>
- Braver, S. L., Thoemmes, F. J., & Rosenthal, R. (2014). Continuously Cumulating Meta-Analysis and Replicability. *Perspect Psychol Sci*, 9(3), 333-342. <http://dx.doi.org/10.1177/1745691614529796>
- Bullard, O., & Manchanda, R. V. (2015). How Goal Distance Influences Regulatory Focus in Goal Pursuit. *Advances in Consumer Research*, 43, 472-473. <https://doi.org/10.1016/j.jcps.2017.01.003>
- Bullard, O., & Manchanda, R. V. (2017). How goal progress influences regulatory focus in goal pursuit. *Journal of Consumer Psychology*, 27(3), 302-317. <http://dx.doi.org/10.1016/j.jcps.2017.01.003>
- Cesario, J., Corker, K. S., & Jelinek, S. (2013). A self-regulatory framework for message framing. *Journal of Experimental Social Psychology*, 49(2), 238-249. <http://dx.doi.org/10.1016/j.jesp.2012.10.014>
- Cesario, J., Grant, H., & Higgins, E. T. (2004). Regulatory Fit and Persuasion: Transfer From 'Feeling Right'. *Journal of Personality and Social Psychology*, 86(3), 388-404. <http://dx.doi.org/10.1037/0022-3514.86.3.388>
- Cesario, J., Higgins, E. T., & Scholer, A. A. (2008). Regulatory Fit and Persuasion: Basic Principles and Remaining Questions. *Social and Personality Psychology Compass*, 2, 444-463. <http://dx.doi.org/10.1111/j.1751-9004.2007.00055.x>

- Crowe, E., & Higgins, E. T. (1997). Regulatory focus and strategic inclinations: Promotion and prevention in decision-making. *Organizational Behavior and Human Decision Processes*, 69(2), 117-132. <http://dx.doi.org/10.1006/obhd.1996.2675>
- Deci, E. L., & Ryan, R. M. (1980). The Empirical Exploration of Intrinsic Motivational Processes. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology* (Vol. 13, pp. 39-80): Academic Press.
- Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality*, 19(2), 109-134. [https://doi.org/10.1016/0092-6566\(85\)90023-6](https://doi.org/10.1016/0092-6566(85)90023-6)
- Deci, E. L., & Ryan, R. M. (2000). The 'what' and 'why' of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227-268. http://dx.doi.org/10.1207/S15327965PLI1104_01
- Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology/Psychologie canadienne*, 49(3), 182-185. <https://doi.org/10.1037/a0012801>
- Del Re, A. C. (2013). compute.es: Compute Effect Sizes (Version R package version 0.2-2). Retrieved from <http://cran.r-project.org/web/packages/compute.es>
- Falomir-Pichastor, J. M., Mugny, G., Gabarrot, F., & Quiamzade, A. (2011). A regulatory fit perspective in majority versus minority support to attitudes toward homosexuals. *Group Processes & Intergroup Relations*, 14(1), 45-62. <https://doi.org/10.1177/1368430210376077>
- Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39, 175-191. <https://doi.org/10.3758/BF03193146>
- Florack, A., Palcu, J., & Friese, M. (2013). The moderating role of regulatory focus on the social modeling of food intake. *Appetite*, 69(Supplement C), 114-122. <https://doi.org/10.1016/j.appet.2013.05.012>
- Franko, D. L., Cousineau, T. M., Trant, M., Green, T. C., Rancourt, D., Thompson, D., . . . Ciccazzo, M. (2008). Motivation, self-efficacy, physical activity and nutrition in college students: Randomized controlled trial of an Internet-based education program. *Preventive medicine*, 47(4), 369-377. <https://doi.org/10.1016/j.ypmed.2008.06.013>
- Freitas, A. L., & Higgins, E. T. (2002). Enjoying goal-directed action: The role of regulatory fit. *Psychological Science*, 13(1), 1-6. <https://doi.org/10.1111/1467-9280.00401>
- Friedman, R. S., & Förster, J. (2001). The effects of promotion and prevention cues on creativity. *Journal of Personality and Social Psychology*, 81(6), 1001-1013. <https://doi.org/10.1037/0022-3514.81.6.1001>

- Fuglestad, P. T., Rothman, A. J., & Jeffery, R. W. (2008). Getting there and hanging on: the effect of regulatory focus on performance in smoking and weight loss interventions. *Health Psychol*, 27(3), 260-270. [http://dx.doi.org/10.1037/0278-6133.27.3\(Suppl.\).S260](http://dx.doi.org/10.1037/0278-6133.27.3(Suppl.).S260)
- Fuglestad, P. T., Rothman, A. J., Jeffery, R. W., & Sherwood, N. E. (2015). Regulatory Focus, Proximity to Goal Weight, and Weight Loss Maintenance. *Am J Health Behav*, 39(5), 709-720. <https://doi.org/10.5993/ajhb.39.5.12>
- Gomez, P., Borges, A., & Pechmann, C. (2013). Avoiding poor health or approaching good health: Does it matter? The conceptualization, measurement, and consequences of health regulatory focus. *Journal of Consumer Psychology*, 23(4), 451-463. <https://doi.org/10.1016/j.jcps.2013.02.001>
- Guo, T., & Spina, R. (2015). Regulatory focus affects predictions of the future. *Personality and Social Psychology Bulletin*, 41(2), 214-223. <https://doi.org/10.1177/0146167214561194>
- Haddad, H., & Delhomme, P. (2006). Persuading young car drivers to take part in a driving skills test: The influence of regulatory fit on informational-assessment value and persuasion. *Transportation Research Part F: Traffic Psychology and Behaviour*, 9(6), 399-411. <https://doi.org/10.1016/j.trf.2006.02.002>
- Higgins, E. T. (1987). Self-discrepancy: a theory relating self and affect. *Psychol Rev*, 94(3), 319-340. <http://dx.doi.org/10.1037/0033-295X.94.3.319>
- Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, 52(12), 1280-1300. <http://dx.doi.org/10.1037/0003-066X.52.12.1280>
- Higgins, E. T. (2000). Making a good decision: Value from fit. *American Psychologist*, 55(11), 1217-1230. <http://dx.doi.org/10.1037/0003-066X.55.11.1217>
- Higgins, E. T. (2005). Value From Regulatory Fit. *Current Directions in Psychological Science*, 14(4), 209-213. <http://dx.doi.org/10.1111/j.0963-7214.2005.00366.x>
- Higgins, E. T., Friedman, R. S., Harlow, R. E., Idson, L. C., Ayduk, O. N., & Taylor, A. (2001). Achievement orientations from subjective histories of success: Promotion pride versus prevention pride. *European Journal of Social Psychology*, 31(1), 3-23. <http://dx.doi.org/10.1002/ejsp.27>
- Higgins, E. T., Idson, L. C., Freitas, A. L., Spiegel, S., & Molden, D. C. (2003). Transfer of value from fit. *Journal of Personality and Social Psychology*, 84(6), 1140-1153. <http://dx.doi.org/10.1037/0022-3514.84.6.1140>
- Higgins, E. T., Shah, J., & Friedman, R. (1997). Emotional responses to goal attainment: Strength of regulatory focus as moderator. *Journal of Personality and Social Psychology*, 72(3), 515-525. <http://dx.doi.org/10.1037/0022-3514.72.3.515>
- Ingledeu, D. K., & Markland, D. (2008). The role of motives in exercise participation. *Psychol Health*, 23(7), 807-828. <https://doi.org/10.1080/08870440701405704>

- Ingledeu, D. K., Markland, D., & Ferguson, E. (2009). Three Levels of Exercise Motivation. *Applied Psychology: Health and Well-Being*, 1(3), 336-355. <https://doi.org/10.1111/j.1758-0854.2009.01015.x>
- Joireman, J., Shaffer, M. J., Balliet, D., & Strathman, A. (2012). Promotion Orientation Explains Why Future-Oriented People Exercise and Eat Healthy: Evidence From the Two-Factor Consideration of Future Consequences-14 Scale. *Personality and Social Psychology Bulletin*, 38(10), 1272-1287. <https://doi.org/10.1177/0146167212449362>
- Kasser, T., & Ryan, R. M. (1996). Further Examining the American Dream: Differential Correlates of Intrinsic and Extrinsic Goals. *Personality and Social Psychology Bulletin*, 22(3), 280-287. <https://doi.org/10.1177/0146167296223006>
- Kelly, N. R., Mazzeo, S. E., & Bean, M. K. (2013). Systematic Review of Dietary Interventions With College Students: Directions for Future Research and Practice. *J Nutr Educ Behav*, 45(4), 304-313. <https://doi.org/10.1016/j.jneb.2012.10.012>
- Latimer, A. E., Rench, T. A., Rivers, S. E., Katulak, N. A., Materese, S. A., Cadmus, L., . . . Salovey, P. (2008). Promoting participation in physical activity using framed messages: An application of prospect theory. *British Journal of Health Psychology*, 13(4), 659-681. <https://doi.org/10.1348/135910707X246186>
- Lee, A. Y., & Aaker, J. L. (2004). Bringing the Frame Into Focus: The Influence of Regulatory Fit on Processing Fluency and Persuasion. *Journal of Personality and Social Psychology*, 86(2), 205-218. <http://dx.doi.org/10.1037/0022-3514.86.2.205>
- Lockwood, P., Jordan, C. H., & Kunda, Z. (2002). Motivation by positive or negative role models: Regulatory focus determines who will best inspire us. *Journal of Personality and Social Psychology*, 83(4), 854-864. <https://doi.org/10.1037/0022-3514.83.4.854>
- Maes, S., & Karoly, P. (2005). Self-Regulation Assessment and Intervention in Physical Health and Illness: A Review. *Applied Psychology*, 54(2), 267-299. <https://doi.org/10.1111/j.1464-0597.2005.00210.x>
- Meyer, J. P., Becker, T. E., & Vandenberghe, C. (2004). Employee commitment and motivation: a conceptual analysis and integrative model. *J Appl Psychol*, 89(6), 991-1007. <https://doi.org/10.1037/0021-9010.89.6.991>
- Milkman, K. (2018). *Behavior Change for Good Initiative*. Retrieved from <https://bcfg.wharton.upenn.edu/team/>
- Ng, J. Y. Y., Ntoumanis, N., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-Determination Theory Applied to Health Contexts: A Meta-Analysis. *Perspectives on Psychological Science*, 7(4), 325-340. <https://doi.org/10.1177/1745691612447309>

- Noar, S. M., Grant Harrington, N., Van Stee, S. K., & Shemanski Aldrich, R. (2010). Tailored Health Communication to Change Lifestyle Behaviors. *American Journal of Lifestyle Medicine*, 5(2), 112-122. <https://doi.org/10.1177/1559827610387255>
- Osbaldiston, R., & Sheldon, K. M. (2003). Promoting internalized motivation for environmentally responsible behavior: A prospective study of environmental goals. *Journal of Environmental Psychology*, 23(4), 349-357. [http://dx.doi.org/10.1016/S0272-4944\(03\)00035-5](http://dx.doi.org/10.1016/S0272-4944(03)00035-5)
- Plessner, H., Unkelbach, C., Memmert, D., Baltes, A., Kolb, A. (2009). Regulatory fit as a determinant of sport performance: How to succeed in a soccer penalty-shooting. *Psychology of Sport and Exercise*, 10(1), 108-115. <https://doi.org/10.1016/j.psychsport.2008.02.001>
- Racette, S. B., Deusinger, S. S., Strube, M. J., Highstein, G. R., & Deusinger, R. H. (2008). Changes in weight and health behaviors from freshman through senior year of college. *J Nutr Educ Behav*, 40(1), 39-42. <https://doi.org/10.1016/j.jneb.2007.01.001>
- Rothman, A. J. (2000). Toward a theory-based analysis of behavioral maintenance. *Health Psychol*, 19(1), 64-69. <http://dx.doi.org/10.1037/0278-6133.19.Suppl1.64>
- Rothman, A. J., Baldwin, A. S., & Hertel, A. W. (2004). Self-regulation and behavior change: Disentangling behavioral initiation and behavioral maintenance. *Handbook of self-regulation: Research, theory, and applications* (pp. 130-148). New York, NY, US: Guilford Press.
- Rothman, A. J., Bartels, R. D., Wlaschin, J., & Salovey, P. (2006). The Strategic Use of Gain- and Loss-Framed Messages to Promote Healthy Behavior: How Theory Can Inform Practice. *Journal of Communication*, 56, 202-220. <https://doi.org/10.1111/j.1460-2466.2006.00290.x>
- Rothman, A. J., & Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin*, 121(1), 3-19. <http://dx.doi.org/10.1037/0033-2909.121.1.3>
- Sanderson, C. A., & Cantor, N. (1995). Social dating goals in late adolescence: implications for safer sexual activity. *J Pers Soc Psychol*, 68(6), 1121-1134. <http://dx.doi.org/10.1037/0022-3514.68.6.1121>
- Shah, J., & Higgins, E. T. (2001). Regulatory concerns and appraisal efficiency: The general impact of promotion and prevention. *J Pers Soc Psychol*, 80(5), 693-705. <https://doi.org/10.1037/0022-3514.80.5.693>
- Silva, M. N., Vieira, P. N., Coutinho, S. R., Minderico, C. S., Matos, M. G., Sardinha, L. B., & Teixeira, P. J. (2010). Using self-determination theory to promote physical activity and weight control: a randomized controlled trial in women. *Journal of Behavioral Medicine*, 33(2), 110-122. <https://doi.org/10.1007/s10865-009-9239-y>
- Spiegel, S., Grant-Pillow, H., & Higgins, E. T. (2004). How regulatory fit enhances motivational strength during goal pursuit. *European Journal of Social Psychology*, 34(1), 39-54. <https://doi.org/10.1002/ejsp.180>

- Taberner, C., & Hernández, B. (2011). Self-efficacy and intrinsic motivation guiding environmental behavior. *Environment and Behavior*, 43(5), 658-675.
<https://doi.org/10.1177/0013916510379759>
- Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 78. <http://dx.doi.org/10.1186/1479-5868-9-78>
- Vella-Zarb, R. A., & Elgar, F. J. (2009). The 'Freshman 5': A Meta-Analysis of Weight Gain in the Freshman Year of College. *Journal of American College Health*, 58(2), 161-166.
<http://dx.doi.org/10.1080/07448480903221392>
- Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, 36(3), 1-48.
- Williams, G. C., Grow, V. M., Freedman, Z. R., Ryan, R. M., & Deci, E. L. (1996). Motivational predictors of weight loss and weight-loss maintenance. *J Pers Soc Psychol*, 70(1), 115-126.
<http://dx.doi.org/10.1037/0022-3514.70.1.115>
- World Health Organization. (2011). *Obesity and Overweight factsheet from the WHO* [Online]. Retrieved from <http://www.thehealthwell.info/node/82914>
- Zaal, M. P., Van Laar, C., Ståhl, T., Ellemers, N., & Derks, B. (2012). Social change as an important goal or likely outcome: How regulatory focus affects commitment to collective action. *British Journal of Social Psychology*, 51(1), 93-110. <http://dx.doi.org/10.1111/j.2044-8309.2010.02006.x>

Appendices

Appendix I

Messages used in Study 2 to manipulate the promotion versus prevention regulatory focus.

Promotion condition

Comment manger sain quand on est étudiant ?

Des chiffres attristants

- Un étudiant sur cinq ne consomme pas plus de deux repas par jour
- 14% ne mangent ni fruits ni légumes
- 95% grignotent entre les repas
- 11% présentent un surpoids voir une obésité
- 12% sont victimes d'une maigreur anormale

Les chiffres le démontrent : l'alimentation des étudiants universitaires est plutôt problématique. Plusieurs facteurs sont en cause mais trois se révèlent particulièrement importants. D'abord, les étudiants n'ont souvent pas le temps de prendre un vrai repas, que ce soit le matin (à cause du temps passé dans les transports) ou à midi (où les horaires de cours variables ne garantissent pas une 'vraie' pause de midi). Ensuite, le stress élevé que vivent de nombreux étudiants au quotidien ne favorise pas une alimentation équilibrée mais pousse au contraire vers la nourriture réconfortante, souvent malheureusement trop grasse et peu équilibrée. Finalement, le facteur financier doit être considéré : manger sain coûte cher, et n'apparaît tout simplement pas comme une option envisageable pour bien des étudiants.

Cette mauvaise alimentation a des conséquences importantes, puisque les étudiants manquent une opportunité de prendre de bonnes habitudes alimentaires qui pourraient perdurer dans la vie et servir de base stable pour une bonne santé dans le futur.

Heureusement, il existe des pistes d'intervention pour aider les étudiants à s'alimenter correctement. Quelques universités commencent ainsi à mettre en place des programmes proposant notamment :

- Des stratégies de gestion du temps pour parvenir à dégager des moments de qualité (même courts) pour profiter des repas
- Des conseils pour des aliments à la fois sains et bon marché
- Des stratégies de régulation émotionnelle pour augmenter le niveau de bien-être

Les premiers résultats sont encourageants : les étudiants participant au programme rapportent moins de sentiment de découragement, plus de satisfaction et, sur quelques semaines, une meilleure alimentation. Il reste maintenant à espérer que ces programmes se multiplient !

Prevention condition



Comment éviter de manger malsain quand on est étudiant ?

Des chiffres alarmants

- Un étudiant sur cinq ne consomme pas plus de deux repas par jour
- 14% ne mangent ni fruits ni légumes
- 95% grignotent entre les repas
- 11% présentent un surpoids voir une obésité
- 12% sont victimes d'une maigreur anormale

Les chiffres le démontrent : l'alimentation des étudiants universitaires est plutôt problématique. Plusieurs facteurs sont en cause mais trois se révèlent particulièrement importants. D'abord, les étudiants n'ont souvent pas le temps de prendre un vrai repas, que ce soit le matin (à cause du temps passé dans les transports) ou à midi (où les horaires de cours variables ne garantissent pas une 'vraie' pause de midi). Ensuite, le stress élevé que vivent de nombreux étudiants au quotidien ne favorise pas une alimentation équilibrée mais pousse au contraire vers la nourriture réconfortante, souvent malheureusement trop grasse et peu équilibrée. Finalement, le facteur financier n'est pas à négliger : manger sain coûte cher, et n'apparaît tout simplement pas comme une option envisageable pour bien des étudiants.

Cette mauvaise alimentation a des conséquences négatives importantes, puisque les habitudes alimentaires prises à cet âge peuvent perdurer dans la vie et créer un terrain propice à des maladies chroniques dans le futur.

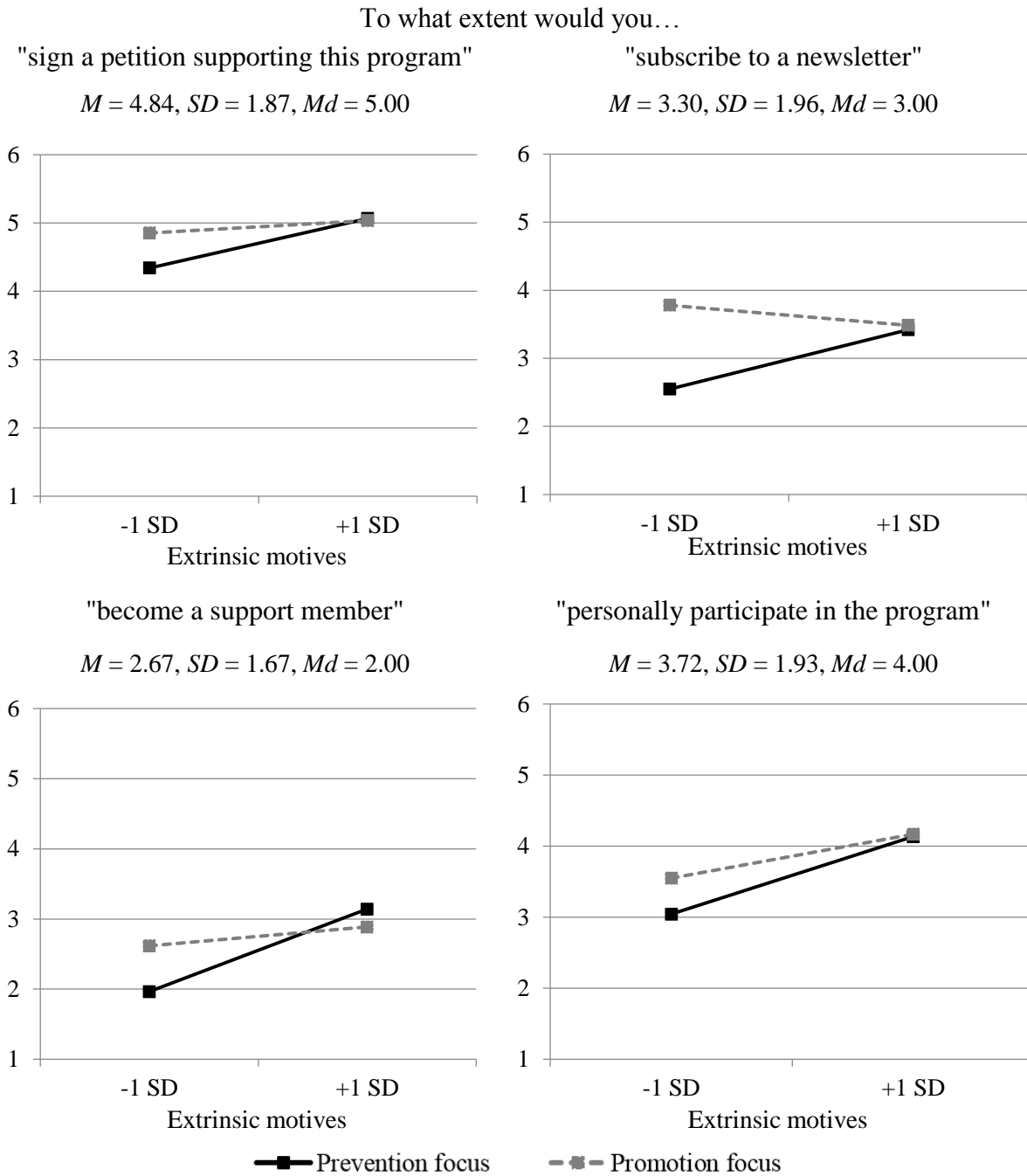
Heureusement, il existe des pistes d'intervention pour aider les étudiants à éviter de s'alimenter incorrectement. Quelques universités commencent ainsi à mettre en place des programmes proposant notamment :

- Des stratégies de gestion du temps pour parvenir à dégager des moments (même courts) et éviter de sauter des repas
- Des conseils pour éviter les aliments malsains sans dépenser trop d'argent
- Des stratégies de régulation émotionnelle pour réduire le niveau de stress

Les premiers résultats sont rassurants : les étudiants participant au programme rapportent plus de sentiment de relaxation, moins de tension et, sur quelques semaines, une meilleure alimentation. Il faudrait maintenant que ces programmes se multiplient !

Appendix II

Extrinsic motives × *regulatory focus* interaction on each item forming the measure of willingness to participate to a nutrition program in Study 2.



Notes

ⁱ One will note that the four questions represent increasing levels of commitment to a given action (i.e., a Guttman scale), ranked from the least engaging (petition signing) to the most engaging (actual participation in the action). As such, one might want to know how motives and message framing impact each level of commitment. For information purposes, we report the graphs of the extrinsic motives \times regulatory focus interaction for each item in Appendix II.