

## Applying self-determination theory to understand the motivational impact of cash rewards: New evidence from lab experiments

Anaïs Thibault Landry<sup>1</sup>, Ying Zhang<sup>2</sup>, Konstantinos Papachristopoulos<sup>3</sup>, and Jacques Forest<sup>4</sup>

<sup>1</sup>Département de psychologie, Université du Québec à Montréal (UQAM), Montréal, Québec, Canada

<sup>2</sup>School of Humanities and Economic Management, China University of Geosciences, Beijing, China

<sup>3</sup>School of Psychology, Aristotle University of Thessaloniki, Thessaloniki, Greece

<sup>4</sup>Département d'organisation et ressources humaines, École des sciences de la gestion de l'UQAM (ESG UQAM), Montréal, Québec, Canada

We investigated, based on self-determination theory (SDT), the impact of the functional meaning of monetary rewards on individuals' motivation and performance and further tested the role of the psychological needs as the underlying mechanism. In two experimental studies, we show that when presented in an autonomy-supportive way, rewards lead participants to experience greater intrinsic motivation, which leads them to perform better, than when monetary rewards are presented in a controlling way. This is mediated by greater psychological need satisfaction, indicating that through greater feelings of competence, autonomy, and relatedness, individuals experience greater intrinsic motivation for the task at hand. Our findings suggest that rewards can have a distinct effect on individuals' motivation and performance depending on whether they take on an autonomy-supportive or controlling meaning, thus providing empirical evidence for the theoretical and practical implications of SDT's concept of functional meaning of rewards. By highlighting the importance of this concept, this research contributes to our understanding of the effectiveness of such rewards in the workplace, suggesting that they can foster employee motivation and performance if organisations present them to employees in an autonomy-supportive way to convey an informational meaning and positively contribute to their psychological need satisfaction.

**Keywords:** Self-determination theory; Functional meaning; Rewards; Psychological needs; Motivation; Performance.

Throughout decades, organisations have been using monetary rewards to attract and retain employees, and as well as to drive performance and ultimately ensure their business success (Demery & Roumpi, 2017). Indeed, in the workplace, offering monetary rewards constitutes a popular compensation practice and organisations commonly use them as a means to incite motivation and performance (Gerhart & Fang, 2014). However, findings from different streams of research do not seem to converge with regards to the effects of financial incentives and

rewards on employees (Cerasoli, Nicklin, & Ford, 2014). On the one hand, a stream of research advocates for the motivational power of money (e.g., Gerhart & Fang, 2014) and on the other hand, research mainly stemming from self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000) advises against using solely money to motivate employees to perform and highlights the importance of focusing instead on the functional meaning of such rewards (e.g., Deci, Koestner, & Ryan, 1999; Moller & Deci, 2014).

Correspondence should be addressed to Jacques Forest, ORH Department, École des sciences de la gestion de l'UQAM (ESG UQAM), C.P. 8888, Downtown Station, Montreal, QC H3C 3P8, Canada. (E-mail: forest.jacques@uqam.ca).

The research was supported by the act "Support of Postdoctoral Researchers" of the European Programme "Human Resources Development, Education and Lifelong Learning", 2014–2020, which was implemented by the State Scholarships Foundation (IKY) and was co-funded by the European Social Fund and the Hellenic State. This research was made possible by a doctoral grant from the Social Sciences and Humanities Research Council to the first author.

The present research aims to shed light on the divergent findings concerning the effectiveness of monetary rewards by uncovering the psychological mechanism explaining why they can have a beneficial impact or not on individuals' motivation and performance. Using postulates of SDT (Deci & Ryan, 1985), we argue that their impact is largely attributable to the way they are presented to individuals; in other words, to the meaning these rewards take on. To investigate this, we conduct two experimental studies on the impact of the functional meaning of rewards (informational vs. controlling) on individuals' psychological needs for competence, autonomy, and relatedness, and subsequent motivation and performance. We empirically test whether presenting rewards in an autonomy-supportive way yields better quality motivation and performance as it contributes to greater psychological need satisfaction, whereas presenting them in a controlling way yields lower quality motivation and performance as it contributes to greater psychological need frustration. We begin by reviewing some evidence on the effectiveness of monetary rewards before elaborating on the postulates from SDT that led to our hypotheses. We then describe the two experimental studies conducted to test these hypotheses, and end with a discussion of the theoretical and applied implications of our findings.

### **The relation between monetary rewards, motivation and performance**

Over the years, organisations' compensation practices have evolved from fixed salaries to using more and more diversified forms of monetary rewards, including bonuses, stock options, gift cards and the likes, in order to achieve desired productivity levels and motivate employees. Indeed, number of field studies indicates that employee performance increased when organisations tied monetary rewards to production (Condly, Clark, & Stolovitch, 2003). However, research delving more deeply into the subject reveals more nuanced results: first, this effect appears to be temporary as performance eventually revolves back to its baseline level and second, it appears to influence the quantity rather than the quality of the output produced (Cerasoli et al., 2014; Jenkins Jr, Mitra, Gupta, & Shaw, 1998).

Research reveals that this effect of rewards on performance stems from a motivational shift that occurs when monetary rewards are introduced as motivators, whereby individuals come to focus on the external, financial gain to be made by engaging in the activity instead of participating in the activity for its own sake and enjoyment, thus leading them to experience greater extrinsic motivation and lower intrinsic motivation (Krug & Braver, 2014; Moller & Deci, 2014). The first studies of reward effects on intrinsic motivation for an activity showed that

rewards, such as money, undermined intrinsic motivation for the activity, whereas other rewards, such as positive feedback, enhanced it (Deci, 1972). These findings were thus interpreted as indicating that rewards could be perceived as having different functional meaning, in other words, as being informational or controlling (Deci & Ryan, 1980). The meta-analysis by Deci et al. (1999) of 128 reward effects showed that all types of rewards (i.e., engagement-contingent, completion-contingent and performance-contingent) significantly decrease intrinsic motivation. However, performance-contingent rewards appeared to have a lower overall negative effect than engagement-contingent and completion-contingent rewards, suggesting that it might convey useful information to the recipient about his or her competence, which then dampened the negative effect of the reward. Along the same lines, Ryan, Mims, and Koestner (1983) showed that when performance-contingent rewards were given in an autonomy-supportive way, participants showed more intrinsic motivation than those in a control group in which the rewards were engagement-contingent without positive feedback, thus suggesting that the autonomy-supportive context highlights the informational aspect of performance-contingent rewards, such as those found in the workplace (Deci, Olafsen, & Ryan, 2017). Further pointing to the importance of autonomy-supportive contexts for workplace rewards, Olafsen, Halvari, Forest, and Deci (2015) showed that autonomy-supportive managerial practices significantly predict greater psychological need satisfaction and intrinsic motivation, thus suggesting that the organisational practices surrounding pay and reward administration may be of more relevance than the objective amount for motivating performance.

### **The functional meaning of monetary rewards**

All this evidence highlights the importance of using motivational theories to understand how employees experience their workplace rewards. In this light, SDT further state that instead of being unidimensional, an individual's motivation ranges from being intrinsic to extrinsic (Ryan & Deci, 2000). Yet, rather than viewing any extrinsic motivation as negative, SDT maintains that extrinsic rewards can take on different functional meanings that then lead to diminishments, enhancements or even no effect on intrinsic motivation (e.g., Deci, 1972; Deci, Connell, & Ryan, 1989; Deci, Eghrari, Patrick, & Leone, 1994; Deci & Ryan, 1985). This thus suggests that offering a reward in an autonomy-supportive way such as to instill an informational meaning, can facilitate intrinsic motivation and compensate for the potential undermining effect of the extrinsic rewards such as money.

More specifically, rewards can be presented in an autonomy-supportive way so that it encourage individuals' efforts and participation in the activity,

thus conferring the reward an informational meaning (Deci et al., 1989, 1994; Moller & Deci, 2014). Alternatively, they can be presented in a controlling, autonomy-threatening, oppressive, and constraining way that increase the pressure that individuals feel, giving rise to a controlling meaning. Although research on the subject is relatively scarce, studies that have been conducted in the sports, health and educational settings, generally support the distinctive impact of those two functional meanings. For instance, at school, providing feedback and rewards in a supportive way is positively associated with students' intrinsic enjoyment and academic performance (Black & Deci, 2000; Soenens, Vansteenkiste, Duriez, & Goossens, 2006). The functional meaning of rewards can thus shed light on the way rewards are presented to individuals, and the three basic psychological needs can explain how this then foster their intrinsic or extrinsic motivation, and influence their performance accordingly.

### The basic psychological needs according to self-determination theory

Fundamental to SDT is the postulate that the effect of external factors such as managerial and compensation practices on employees' motivation and workplace experience is mediated by their effect on their psychological needs for competence, autonomy and relatedness (Deci & Ryan, 2000). Together, these three needs are essential for optimal functioning and healthy motivation (Ryan & Deci, 2000, 2008). In terms of their need for competence, individuals must believe they can master the necessary skills and abilities in order to achieve their desired outcomes. As for their need for autonomy, individuals must have a sense of volition in choosing the activity and feel like they can act in concordance with their true self and values. Finally, for their relatedness need, individuals must feel that they can emotionally connect to others in their surrounding. The theory postulates that these basic psychological needs can be more or less fulfilled depending on individuals' contexts and that greater satisfaction of these needs will lead to better outcomes, including intrinsic motivation for the specific activity the individual engages in (Ryan & Deci, 2008). Much empirical evidence in social and organisational settings has been gathered to support this claim (De Cooman, Stynen, Van den Broeck, Sels, & De Witte, 2013; Olafsen et al., 2015; Trépanier, Forest, Fernet & Austin, 2015; Vansteenkiste et al., 2007).

While extensive research has shown need satisfaction to be a strong predictor of optimal functioning, a growing body of research indicates that it may not constitute the best predictor of sub-optimal functioning since the mere absence of need satisfaction may not adequately explain why individuals do not thrive in a given context (Bartholomew, Ntoumanis, Ryan, Bosch, &

Thøgersen-Ntoumani, 2011). Instead, psychological need frustration would be a better predictor as it goes beyond low need satisfaction to include the active thwarting of the psychological needs (Vansteenkiste & Ryan, 2013), meaning that individuals experience actual feelings of rejection (as opposed to not feeling related), incompetence (as opposed to not feeling competent), and oppression (as opposed to not feeling autonomous). To this point, a recent meta-analysis of 119 samples indicated that need satisfaction was less effective in predicting negative work outcomes than positive ones, leading the researchers to emphasise the importance of assessing need frustration as well as satisfaction in studies (Van den Broeck, Lance Ferris, Chang, & Rosen, 2016).

### The present research

Based on these postulates, we propose that, to better understand the impact of monetary rewards on individuals' performance, research must investigate the mechanism by which such rewards lead to different types of motivation. To do so, a first important step was to build on the existing literature and replicate previous findings in this field by assessing need satisfaction as a mediator. A second step was to include need frustration, and then investigate the relation between the two distinct functional meanings of rewards (informational vs. controlling), the types of motivation arising (intrinsic vs. extrinsic) and subsequent performance. Hence, we tested the following hypotheses:

*Hypothesis 1:* Presenting rewards in an autonomy-supportive way so as to convey an informational meaning leads to greater performance than presenting them in a controlling way so as to confer a controlling meaning.

*Hypothesis 2:* The effect of informational rewards on performance is mediated by greater psychological need satisfaction, giving rise to greater intrinsic motivation, whereas the effect of controlling rewards on performance is mediated by greater psychological needs frustration, giving rise to greater extrinsic motivation.

## STUDY 1: METHODOLOGY

### Participants

Participants were recruited through their "Introduction to Organizational Behavior" course in a Canadian university. Students volunteered to take part in the study and were randomly assigned to either the informational or the controlling conditions. The final sample consisted of 123 students (65 and 58 participants in the informational and controlling groups, respectively). Participants all spoke

French, the mean age was 23 years ( $SD = 4.93$ ), and 60% were women. Detailed explanation of the study procedure was given to participants at the beginning of the study and informed consent, in compliance with the ethical standards of the Institutional Research Committee of the first author, was obtained.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the Institutional Research Committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual adult participants included in the study.

## Procedure

At the beginning of the study, participants were asked to read a short instruction paragraph for the task they were about to perform. This instruction paragraph was adapted to be either autonomy-supportive, so as to convey an informational to the reward being offered for performing the task at hand (a \$10 gift card for a local coffee shop), or controlling, that is, autonomy-threatening, so as to convey a controlling meaning to the reward. Similar manipulations have been used in previous social psychology studies on human motivation (Deci et al., 1989; Ryan et al., 1983). Both instruction paragraphs were reviewed by a panel of 7 SDT content experts and pilot-tested in an independent sample of 50 students who rated them on a scale from 1 “not at all” to 5 “extremely” autonomy-supportive and controlling, thus assessing the distinct meaning conveyed, yet equivalent in terms of valence.

In the “autonomy-supportive condition,” task instructions, including the description of the reward, were presented in a supportive and encouraging way to convey an informational meaning. For example, participants were told that “the monetary reward was offered to them as a token of appreciation for their contribution.” Mean ratings from the independent student sample during the pilot test was as follows: 4.0 on 5.0 for the informational meaning, 2.0 on 5.0 for the controlling mean, and 3.0 on 5 for the positive and the negative valence.

In the “controlling condition,” task instructions, including the description about the reward, were presented in an autonomy-threatening and pressuring way to convey a controlling meaning. For example, participants were told that “the monetary reward was used as a mean to reinforce the performance standards for the task at hand.” Mean ratings from the independent student sample during the pilot test was as follows: 2.3 on 5.0 for the informational meaning, 4.3 on 5.0 for the controlling mean, and 3.0 on 5 for the positive and the negative valence.

## Manipulation check

Once they had read the instructions, participants completed a manipulation check to validate the effectiveness of the conditions, in which they were asked to indicate a word or expression that summarised the instruction paragraph. Prior to analysing the data, the answers provided by the participants were coded by two independent raters as either indicating an informational or a controlling meaning. Examples of words and expressions coded by the independent raters as reflecting an informational meaning include “being motivated” and “feeling encouraged,” while examples reflecting a controlling meaning include “need to perform” and “feeling pressured.”

## Measures

*Self-reported measures.* All measures had validated French versions available and were rated on a 7-point Likert scale ranging from 1 “Strongly disagree” to 7 “Strongly agree” (with the exception of the control variables which were rated on a 5-point Likert scale). Reliability coefficients for all measures are presented along the diagonal in Table 1.

*Mediating variables. Psychological need satisfaction and frustration.* Participants rated the extent to which they felt their psychological needs were satisfied and frustrated using the Basic Psychological Needs Satisfaction

**TABLE 1**  
Study 1 descriptive, coefficient alphas (along the diagonal), correlation between variables ( $N = 123$ )

Variables	1	2	3	4	5	6	7	8
1. Need satisfaction	(.85)							
2. Need frustration	-.26**	(.89)						
3. Extrinsic motivation	-.19*	.31**	(.86)					
4. Intrinsic motivation	.53**	-.19*	-.20*	(.83)				
5. Performance	.22*	-.20*	-.21*	.34**	—			
6. Negative affect	-.21*	.17	.02	-.05	-.18*	(.70)		
7. Positive affect	.23**	-.09	-.28*	.39**	.22*	.33**	(.84)	
8. Perceived value of reward	.25**	.12	.06	.25**	-.02	-.04	.11	(.85)

\* $p < .05$ . \*\* $p < .01$ .



Scale (Van den Broeck, Vansteenkiste, Witte, Soenens, & Lens, 2010) and the Psychological Need Thwarting Scale (Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2010), using shorter version and adapted the items to the present moment for the experimental design. Each need was assessed using respectively four items for its satisfaction and its frustration, with the exceptions of autonomy and relatedness need satisfaction, which were each assessed with three items. Sample items include for competence: “I really master the task right now” versus “I feel inadequate right now”, for autonomy: “I feel like I can be myself right now” versus “I feel pushed to behave in certain ways right now”, and for relatedness: “I feel part of a group right now” versus “I feel like other people dislike me right now.” Factor analysis to further ensure validity of the scales for used yielded the following results with three factors, one representing each need: competence, autonomy and relatedness, with the specified items, for psychological need satisfaction:  $\chi^2/df = 1.16$ , CFI = .99, IFI = .99, GFI = .97, SRMR = .08 and RMSEA = .04; and  $\chi^2/df = 1.57$ , CFI = .98, IFI = .98, GFI = .93, SRMR = .16 and RMSEA = .07 for psychological need frustration.

*Outcome variables. Intrinsic and extrinsic motivation.* Participants reported their intrinsic and extrinsic motivation using the Situational Motivation Scale (Guay, Vallerand, & Blanchard, 2000). In response to the stem “Why are you currently engaged in this activity?” participants indicated the extent to which they endorsed each reason mentioned in the item, using a 7-point scale, ranging from 1 “Does not correspond at all” to 7 “Corresponds exactly.” Sample items include “because I think that this activity is interesting” for intrinsic motivation and “because I feel that I have to do it” for extrinsic motivation.

*Performance.* After reading the instructions, participants completed a short task which consisted of 25 4-letter anagrams. The task was timed such that all participants had 2 minutes to correctly identify as many as possible 4-letter words hidden in the 25 strings of scrambled letters. This task has been used in a variety of laboratory experiments with students and adults, and is considered a valid measure of performance (Porath & Erez, 2007). In order to calculate an overall performance score that would account for both the quantity and the quality of the answers provided, participants’ answers were coded as right or wrong. A composite performance score was then calculated using the formula: “number of right answers—number of wrong answers/the total of possible right answers.”

*Control variables.* To further control for confounding individual differences arising from the two conditions of task instructions, participants completed two measures.

*Perceived value of reward.* Participants rated on a 3-item scale how valuable the reward was (Hennig-Thurau & Paul, 2007). The composite score was used in the main analyses to control for individual differences in motivation arising from variations in the perceived value of the reward offered.

*Positive and negative affect.* Participants completed the Positive affect and Negative affect Scale-Short form (Watson, Clark, & Tellegen, 1988). Composite scores reflecting their positive affect, based on indicators such as feeling “alert” and “inspired”, and their negative affect, based on indicators such as feeling “upset” and “nervous,” were used in the main analyses to control for individual differences in affect arising from reading either instruction paragraph.

## RESULTS AND DISCUSSION

### Preliminary analyses

Confirmatory factor analysis was conducted to assess the validity of the factor structure underlying the study measures and the 4-factor measurement model showed the best fit indices compared to alternative models, thus supporting the uniqueness of each variable in this study.

Analysis of the correlation matrix for all the variables under study (Table 1) offered preliminary support for our hypotheses and revealed that psychological need satisfaction was positively related to intrinsic motivation and performance, and negatively related to extrinsic motivation. Psychological need frustration, on the other hand, was negatively related to intrinsic motivation and performance, and positively related to extrinsic motivation.

### Main analyses

#### Independent sample t tests

To investigate whether the conditions had the hypothesized effect on participants’ psychological needs, motivation, and performance, independent sample *t* tests were conducted. Results, including mean values, standard deviations, as well as Cohen’s *d* effect sizes, indicating the standardised mean differences across the two conditions, are presented in Table 2. Differences between the conditions on psychological need satisfaction ( $t = 2.62, p < .01$ ) and frustration ( $t = -2.26, p < .05$ ), as well as on extrinsic motivation ( $t = -3.49, p < .01$ ) and intrinsic motivation ( $t = 4.07, p < .01$ ), and on performance ( $t = 6.52, p < .01$ ) were all significant and in the hypothesized direction.

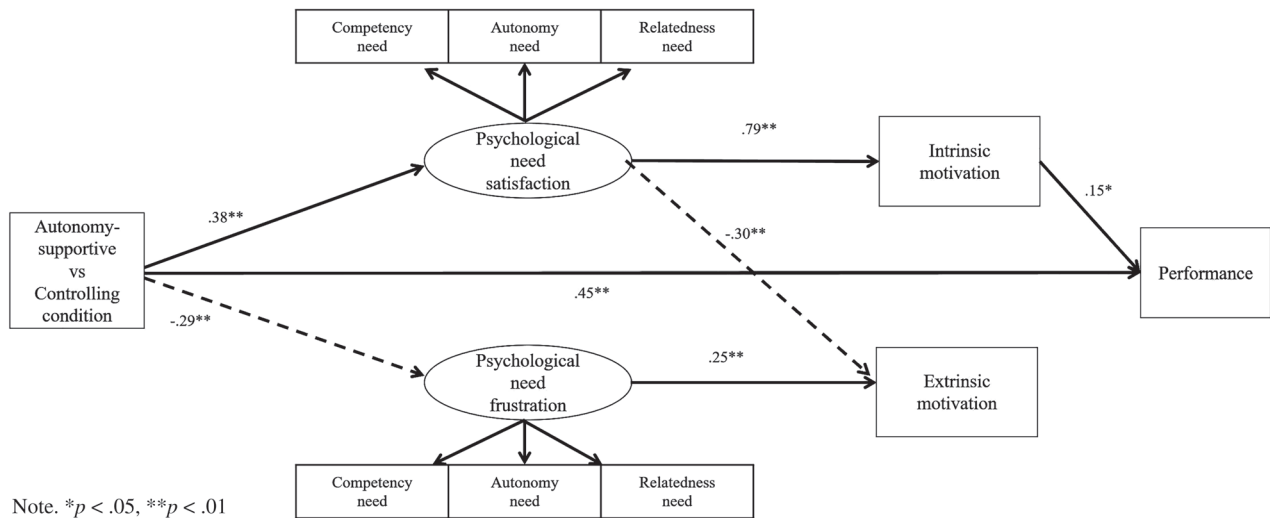
#### Model testing

A full model representing our hypotheses was tested in path analysis using AMOS 18.0 and results, including

**TABLE 2**  
Results of independent *t* tests for Study 1 and Study 2

Variables	Study 1 ( <i>N</i> = 123)				Study 2 ( <i>N</i> = 325)			
	Autonomy-supportive condition ( <i>N</i> = 65), Mean (SD)	Controlling condition ( <i>N</i> = 58), Mean (SD)	<i>t</i>	Cohen's <i>d</i>	Autonomy-supportive condition ( <i>N</i> = 170), Mean (SD)	Controlling condition ( <i>N</i> = 155), Mean (SD)	<i>t</i>	Cohen's <i>d</i>
1. Need satisfaction	5.79 (0.73)	5.39 (0.92)	2.62**	0.48	5.63 (0.83)	5.28 (0.94)	3.57**	0.39
2. Need frustration	2.41 (1.01)	2.83 (1.01)	-2.26*	-0.42	2.46 (1.00)	2.73 (1.20)	-2.29*	-0.24
3. Extrinsic motivation	3.10 (1.44)	3.95 (1.25)	-3.49*	-0.63	2.98 (1.14)	3.33 (1.28)	-2.58*	-0.20
4. Intrinsic motivation	5.31 (1.03)	4.56 (1.01)	4.07**	0.74	4.65 (1.04)	4.38 (1.39)	2.05*	0.22
5. Performance	0.76 (0.16)	0.54 (0.21)	6.52**	1.18	0.77 (0.12)	0.73 (0.11)	3.13**	0.35

Note: Cohen's *d* effect sizes are presented with each number representing the standardised difference in each variable between the autonomy-supportive and controlling conditions. Positive Cohen's *d* indicates that the mean for the autonomy-supportive condition is higher than the controlling condition. \* $p < .05$ . \*\* $p < .01$ .



**Figure 1.** Results for Study 1. Only the significant relations with their standardised path coefficients are shown. Continuous lines represent positive relations between the connected variables, and dotted lines represent negative relations between the connected variables.

standardised  $\beta$  path coefficients obtained by maximum likelihood estimation, are represented in Figure 1. The hypothesized model was composed of the main variables, including the two conditions (dummy-coded), psychological need satisfaction and frustration, intrinsic and extrinsic motivation, and performance, as well as the three control variables. Four goodness-of-fit indices were used: the Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), Incremental Fit Index (IFI) and Goodness of Fit Index (GFI). Generally, values around .90 for the CFI, IFI and GFI, whereas values below .08 for the standardized root mean square residual (SRMR) and RMSEA indicate a satisfactory fit (Hu & Bentler, 1999). The hypothesized model showed satisfactory fit indices:  $\chi^2/df = 1.53$ , CFI = .93, IFI = .93, GFI = .91, SRMR = .07 and RMSEA = .06.

In line with Hypothesis 1, the path between condition and performance was positive ( $\beta = .45$ ,  $p < .01$ ) such that participants in the “autonomy-supportive” condition performed better on the task than participants

in the “controlling” condition. Providing support to Hypothesis 2, participants in the “autonomy-supportive” condition reported greater psychological need satisfaction ( $\beta = .38$ ,  $p < .01$ ), and in turn, greater psychological need satisfaction predicted greater intrinsic motivation ( $\beta = .79$ ,  $p < .01$ ), which positively predicted performance ( $\beta = .15$ ,  $p < .10$ ). An additional negative path from psychological need satisfaction to extrinsic motivation was found ( $\beta = -.30$ ,  $p < .01$ ). Finally, participants in the “controlling” condition reported greater psychological need frustration ( $\beta = .29$ ,  $p < .01$ ), and in turn, greater psychological need frustration predicted greater extrinsic motivation ( $\beta = .25$ ,  $p < .01$ ). Extrinsic motivation did not predict performance ( $\beta = -.03$ ,  $p > .05$ ).

### Analysis of indirect effects

The indirect effects indicating the meditating paths between the two conditions, psychological need

**TABLE 3**  
Study 1 bootstrap analysis results of indirect effects and direct effect

Links	$\beta$ for DV (indirect effect)	$\beta$ for MV (direct effect)	$\beta$ for DV (direct effect)	95% CI bootstrap	
				Lower	Upper
Condition → Need satisfaction → Intrinsic motivation	.22*	.22*	.54*	0.02	0.26
Condition → Need satisfaction → Extrinsic motivation	-.29***	.23*	-.22**	-0.16	0.02
Condition → Need frustration → Extrinsic motivation	-.27*	-.30**	.25**	-0.18	-0.01
Condition → Intrinsic motivation → Performance	.46*	.39**	.15**	0.01	0.13
Condition → Need satisfaction → Performance	.46*	.23*	.19**	0.00	0.16
Need satisfaction → Intrinsic motivation → Performance	.25	.63**	.19	-0.06	0.29

Note: DV, dependent variable; MV, mediating variable.  
\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .10$ .

**TABLE 4**  
Study 2 descriptive, coefficient alphas (along the diagonal), correlation between variables ( $N = 325$ )

Variables	1	2	3	4	5	6	7	8
1. Need satisfaction	(.84)							
2. Need frustration	-.34**	(.91)						
3. Extrinsic motivation	-.15**	.29**	(.74)					
4. Intrinsic motivation	.32**	-.25**	-.10	(.89)				
5. Performance	.19**	-.10	-.01	.19**	—			
6. Negative affect	-.33**	.30**	.13*	-.29**	.00	(.75)		
7. Positive affect	.24**	-.18**	-.07	.34**	.13*	.03	(.80)	
8. Perceived value of reward	.05	.15**	.16**	.16**	.02	-.01	.12	(.85)

\* $p < .05$ . \*\* $p < .01$ .

satisfaction and frustration, and intrinsic and extrinsic motivation were analysed using bootstrapping, and 95% confidence intervals (CIs) were computed from 5000 bootstrap samples (MacKinnon, Lockwood, & Williams, 2004). Indirect effects are said to be significant when CIs exclude 0 and the  $p$ -value is below .05. As shown in Table 3, most indirect effects were significant and provided further support for Hypothesis 2, indicating that psychological need satisfaction acts as a mediator between the condition and intrinsic motivation ( $\beta = .22, p < .05, 95\% \text{ CI} = 0.02\text{--}0.26$ ), and between the condition and performance ( $\beta = .46, p < .05, 95\% \text{ CI} = 0.01\text{--}0.13$ ). The indirect effect of intrinsic motivation between the condition and performance was also significant ( $\beta = .46, p < .05, 95\% \text{ CI} = 0.01\text{--}0.13$ ). However, the indirect effect of intrinsic motivation as a mediator between psychological need satisfaction and performance was not ( $\beta = .25, p > .05, 95\% \text{ CI} = -0.06$  to 0.29). Additionally, we tested but did not find support for an indirect effect between the condition and extrinsic motivation through psychological need satisfaction ( $\beta = -.29, p < .10, 95\% \text{ CI} = -0.16$  to 0.02). Results also provided support for the indirect effect between the condition and extrinsic motivation through psychological need frustration ( $\beta = -.27, p < .05, 95\% \text{ CI} = -0.18$  to  $-0.01$ ).

Overall, results of Study 1 provided general support for the differential impact of rewards on individuals' performance based on their functional meaning, and the role

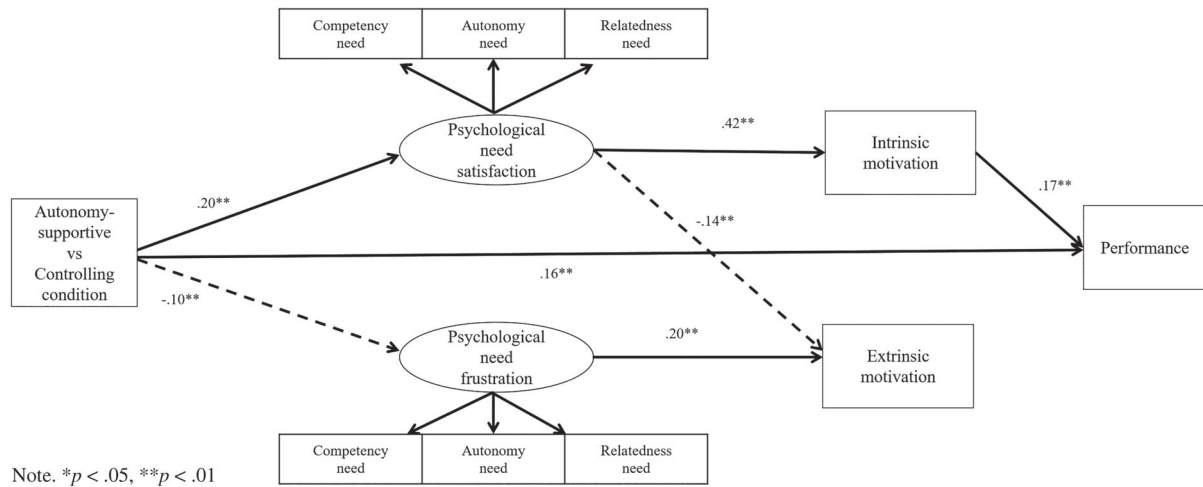
of the psychological needs as the underlying psychological mechanism in this relation. Moreover, it seems that much of this effect appears to be driven by the positive loop whereby presenting rewards in an informational way positively contributes to individuals' psychological need satisfaction, which in turn leads to greater intrinsic motivation and increased performance quality.

Given the initial support found for our hypotheses, we conducted a second study aimed at replicating our findings in a larger, more heterogeneous sample than a student-based sample. To do so, we adapted the experiment to be web-based and invited the general population to participate.

## STUDY 2: METHODOLOGY

### Participants and procedure

A total of 325 adult participants were recruited through online ads posted on public websites. Mean age was 26 years ( $SD = 6.69$ ), and 80% were women. For this study, participation was web-based, on a voluntary basis, and the monetary reward was a \$25 gift card sent electronically. Participants were randomly assigned to either the "autonomy-supportive" condition ( $N = 170$ ) or the "controlling" condition ( $N = 155$ ). The study procedure, including the instructions, the manipulation check, and the self-reported measures, were the same as in Study 1. Reliability coefficients for all measures are reported along



**Figure 2.** Results for Study 2. Only the significant relations with their standardised path coefficients are shown. Continuous lines represent positive relations between the connected variables, and dotted lines represent negative relations between the connected variables.

the diagonal in Table 4. Only the performance task was adapted in order to minimise the risk of cheating, as solutions for anagrams can easily be found with web searches, and the online design of the study provided no means to limit such access.

**Performance.** Participants completed a short visual task consisting of three pairs of images in which they had to identify hidden differences. Similar visual tasks have been used in a variety of social psychology experiments with adults, and have been demonstrated as valid measures of performance (Putwain, Kearsley, & Symes, 2012; Ryan et al., 1983). The difficulty and number of differences were increased in each pair of images to avoid a ceiling effect. Hence, there were six hidden differences in the first pair of images, seven differences in the second pair and eight differences in the third pair. Participants were not told the exact number of differences to uncover; they were only instructed to correctly identify as many differences as they could. Unlike the task in Study 1, this task was not timed and participants were free to take as much time as they needed to complete it. As in Study 1, participants' answers were coded as right or wrong, and performance score for each pair was calculated with the formula: "number of right answers – number of wrong answers/the total of possible right answers per pair". Scores for the three pairs of images were then averaged to create a unique overall performance score.

## RESULTS AND DISCUSSION

### Preliminary analyses

Analysis of the correlation matrix of the study variables (Table 4) offered preliminary support for our hypotheses and replicated the results found in Study 1. As such, psychological need satisfaction was positively related

to intrinsic motivation and performance, and negatively related to extrinsic motivation. Psychological need frustration was negatively related to intrinsic motivation, and positively related to extrinsic motivation.

### Main analyses

#### Independent sample *t* tests

Similar to Study 1, independent sample *t* tests were conducted to investigate the effect of conditions on participants' psychological needs, motivation and performance. Results for this study, including mean values, standard deviations, as well as Cohen's *d* effect sizes, indicating the standardised mean differences across the two conditions, are also presented in Table 2. Differences between the conditions on psychological need satisfaction ( $t = 3.57, p < .01$ ), psychological need frustration ( $t = -2.29, p < .05$ ), extrinsic motivation ( $t = -2.58, p < .01$ ), intrinsic motivation ( $t = 2.05, p < .05$ ), and performance ( $t = 3.13, p < .01$ ) were all significant and in the hypothesized direction.

#### Model testing

As in Study 1, the proposed model, with the main variables, including the two conditions (dummy-coded), psychological need satisfaction and frustration, intrinsic and extrinsic motivation, and performance, as well as the three control variables, namely negative and positive affect, and perceived value of the reward offered, was tested in path analysis using AMOS 18.0. The model provided satisfactory fit indices:  $\chi^2/df = 2.25$ , CFI = .91, IFI = .91, GFI = .95, SRMR = .06 and RMSEA = .06. Standardised



**TABLE 5**  
Study 2 bootstrap analysis results of indirect effects and direct effect

Links	$\beta$ for DV (indirect effect)	$\beta$ for MV (direct effect)	$\beta$ for DV (direct effect)	95% CI bootstrap	
				Lower	Upper
Condition → Need satisfaction → Intrinsic motivation	.01**	.19**	.48	0.04	0.17
Condition → Need satisfaction → Extrinsic motivation	-.18**	.19**	-.22	-0.09	-0.01
Condition → Need frustration → Extrinsic motivation	-.10*	-.11*	-.31	-0.08	-0.01
Condition → Need frustration → Intrinsic motivation	.09*	-.11*	-.31	0.00	0.07
Condition → Intrinsic motivation → Performance	.15*	.13*	.17**	0.01	0.05
Condition → Need satisfaction → Performance	.13*	.19**	.17*	0.01	0.08
Need satisfaction → Intrinsic motivation → Performance	.14***	.48**	.11	-0.01	0.12

Note: DV, dependent variable; MV, mediating variable.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .10$ .

$\beta$  path coefficients obtained by maximum likelihood estimation are visually presented in Figure 2 and described below.

Consistent with Study 1, results for Study 2 supported our hypotheses. For Hypothesis 1, the path between the condition and performance was positive ( $\beta = .16, p < .01$ ), indicating that participants in the “autonomy-supportive” condition performed better than participants in the “controlling” condition. For Hypothesis 2, participants in the “autonomy-supportive” condition reported greater psychological need satisfaction ( $\beta = .20, p < .01$ ), and in turn, greater psychological need satisfaction predicted greater intrinsic motivation ( $\beta = .42, p < .01$ ), which positively predicted performance ( $\beta = .17, p < .05$ ). As in Study 1, an additional negative path from psychological need satisfaction to extrinsic motivation was found ( $\beta = -.14, p < .01$ ). Finally, participants in the “controlling” condition reported greater psychological need frustration ( $\beta = -.10, p < .10$ ), and in turn, greater psychological need frustration predicted greater extrinsic motivation ( $\beta = .20, p < .05$ ) and lower intrinsic motivation ( $\beta = -.10, p < .01$ ). However, as observed in Study 1, extrinsic motivation did not predict performance ( $\beta = .03, p > .05$ ).

### Analysis of indirect effects

Indirect effects of the hypothesized paths were tested using the same procedure as in Study 1. As shown in Table 5, the indirect effects were significant and provided support for Hypothesis 2, indicating that psychological need satisfaction acted as a mediator between the condition and intrinsic motivation ( $\beta = .01, p < .05, 95\% \text{ CI} = 0.04\text{--}0.17$ ), and between the condition and performance ( $\beta = .13, p < .05, 95\% \text{ CI} = 0.01\text{--}0.08$ ). In this study, intrinsic motivation acted as a mediator between the condition and performance ( $\beta = .15, p < .05, 95\% \text{ CI} = 0.01\text{--}0.05$ ) as well as between psychological need satisfaction and performance ( $\beta = .14, p < .10, 95\% \text{ CI} = -0.01\text{ to }0.12$ ). Additionally, we tested and found

support for an indirect effect between the condition and extrinsic motivation through psychological need satisfaction ( $\beta = -.18, p < .05, 95\% \text{ CI} = -0.09\text{ to }-0.01$ ). Results also provided support for the indirect effect between the condition and extrinsic motivation through psychological need frustration ( $\beta = -.10, p < .05, 95\% \text{ CI} = -0.08\text{ to }-0.01$ ).

The results of Study 2 replicated those of Study 1, thus providing converging evidence for the differential impact of the functional meaning of monetary rewards on individuals' performance. In this light, the findings in the two studies with students and with adults point to: (a) the role of intrinsic and extrinsic motivation on performance on different tasks upon presentation of a monetary reward and (b) the mediating role of the psychological needs in the type of motivation that arise in individuals based on the functional meaning the reward take on.

## GENERAL DISCUSSION

The current research offers insight as to the context under which external rewards, such as monetary rewards, can lead to greater performance. More specifically, through the psychological needs and the resulting types of motivation that emerge, our two studies show that external rewards can be leveraged to foster individuals' performance when they are presented in an autonomy-supportive way that satisfies their psychological needs and elicits intrinsic motivation. In this light, our research replicates other research conducted within SDT's framework, and provides additional evidence for the importance of the functional meaning of extrinsic rewards on motivation and performance (e.g., Deci, 1972; Deci et al., 1999). Our research also further corroborate Cerasoli et al.'s (2014) finding that intrinsic motivation is more strongly associated with performance when financial incentives are less directly salient. Our current findings indicate that presenting monetary rewards in an autonomy-supportive way so as to convey an informational meaning leads to better performance

than presenting them in a controlling, pressuring and coercive way, so as to convey a controlling meaning. This strengthens the argument made by other researchers who have found autonomy-supportive contexts to be more conducive of employee performance (e.g., Baard, Deci, & Ryan, 2004; Olafsen et al., 2015) above and beyond simply offering money.

Our results further suggest that the beneficial impact of providing rewards with an informational meaning for performance is not the mere consequence of participants focusing simply on output quantity, as the performance scores in our studies took into account the number of right and wrong answers (hence performance quality). As such, it appears that through greater psychological need satisfaction and increased intrinsic motivation, presenting rewards in an autonomy-supportive way to convey an informational meaning led participants to care about providing answers of quality (i.e., right answers), thus leading them to have better overall performance score.

Our results also highlight the importance of psychological needs in the relation between the functional meaning of rewards and individuals' motivation and performance. In this light, our research is one of the few to offer empirical evidence that presenting rewards in an autonomy-supportive way to convey an informational meaning can promote individuals' need satisfaction for competence, autonomy and relatedness, which then leads them to experience healthier forms of motivation (i.e., intrinsic motivation) and ultimately perform better. Rewards with such meaning can thus be efficient tools to help individuals feel more competent, autonomous, and connected to others (and conversely less incompetent, oppressed, and rejected) as they engaged in the activity for which they are being rewarded. This corroborates other SDT researchers' arguments about the beneficial effects of financial incentives on employees' psychological needs for competence and autonomy (e.g., Gagné & Forest, 2008; Stone et al., 2009). Our current research further extends this argument by providing empirical evidence that it can positively contribute to their relatedness need since presenting rewards in an autonomy-supportive way can positively influence one's sense of belonging.

On the other hand, presenting rewards in a controlling way risks diminishing, and even thwarting individuals' basic psychological needs, which then leads them to experience less healthy and more instrumental forms of motivation, namely extrinsic motivation. This instrumental form of motivation seems to bear no beneficial impact on performance, suggesting that individuals may care too much about their output quantity or conversely may care too little about the quality of their work, to show better performance levels, when they focus on potential monetary gains.

Finally, it is worth noting that our results held even when controlling for the perceived value of the monetary reward offered, further pointing to the importance of

the meaning attributed to the reward (and not the reward itself). Indeed, in our two studies, the functional meaning of the reward had an effect over and above that of the perceived value of the reward, indicating that the meaning the reward takes on has an impact on individuals' motivation and performance, regardless of the extent to which individual value the reward.

## Limitations and future research

While the current study provides support for the functional meaning of rewards, more robust experimental designs are required to better understand the respective impact of the informational and the controlling meanings of rewards. Hence, the next step would be to include a control condition, in which the monetary rewards would be presented in a neutral way, in order to have a baseline measure of the impact of simply using money as a motivator.

In a similar vein, more robust experimental testing should be conducted in the field, in real-life workplace, in order to provide ecologically valid results. Field experiments assessing actual changes in employees' attitudes and behaviours would provide more convincing empirical evidence of the importance of the functional meaning of workplace rewards. Moreover, in line with suggestions stemming from meta-analytic studies (e.g., Cerasoli et al., 2014; Weibel, Rost, & Osterloh, 2010), field experiments could take into consideration parameters such as the nature of rewards and its specific contingencies (i.e., engagement-contingent, completion-contingent and performance-contingent rewards) as well as the qualitative and quantitative dimensions of performance.

Finally, future research should investigate the impact of the two functional meanings on each distinctive psychological need. As such, all three psychological needs were combined into overall indicators of need satisfaction and frustration in our studies, yet SDT argues for the uniqueness of each need. Despite these overall measures being justified in the face of the high correlations between the measures (Van den Broeck et al., 2016) and the better fit for confirmatory factor analysis (Rosen, Ferris, Brown, Chen, & Yan, 2014), future research could examine potential differentiated effects of the informational and the controlling meaning of rewards on the need for autonomy, competence and relatedness.

## Practical implications

Despite its limitations, the current research offers insight as to the context under which monetary rewards can foster performance. This thus points to the importance for organisations to carefully consider how they present monetary rewards in reward programs to their employees. In order to achieve the positive benefits from using

monetary rewards on employees' performance, organisations should ensure that they present them in an autonomy-supportive way that conveys an informational meaning. Our research suggests that misrepresentation of the rewards as controlling could, to a certain extent, risk creating a negative impact, whereby using these rewards leads employees to feel incompetent, oppressed, and isolated from their colleagues as they work, making these rewards less likely to be adequate motivators. As many recent empirical studies show (e.g., Kushlev, Dunn, & Lucas, 2015; Landry et al., 2016) money is more likely to be a symbol that takes on different functional meanings and serves multiple purposes, and these questions should be investigated as they have implications for individuals both at work and outside work.

## CONCLUSION

The current findings contribute to the debate surrounding the motivational impact of monetary rewards, and suggest that using such rewards is not inherently detrimental or beneficial. Instead, it would appear that it is the meaning that is conveyed through the presentation of the monetary rewards that determines the impact of such reward on individuals' motivation and subsequent performance. Monetary rewards presented in a coercive, pressuring way risk conveying a controlling meaning and falling short in fulfilling individuals' psychological needs for competence, autonomy and relatedness. As such, they are more likely to elicit more instrumental forms of motivation, such as extrinsic motivation, in which individuals focus on the external monetary gains and care less about the quality of their work or too much about their output quantity, thus leading to little beneficial impact on their performance. On the other hand, presenting monetary rewards in an autonomy-supportive and encouraging way to convey an informational meaning can be a powerful tool to contribute to individuals' psychological need satisfaction, and lead them to experience more intrinsic motivation as they engage in the task, thus leading them to perform better.

Manuscript received July 2018

Revised manuscript accepted July 2019

## REFERENCES

- Baard, P. P., Deci, E. L., & Ryan, R. M. (2004). Intrinsic need satisfaction: A motivational basis of performance and well-being in two work settings. *Journal of Applied Social Psychology, 34*, 2045–2068.
- Bartholomew, K. J., Ntoumanis, N., & Thøgersen-Ntoumani, C. (2010). The controlling interpersonal style in a coaching context: Development and initial validation of a psychometric scale. *Journal of Sport and Exercise Psychology, 32*(2), 193–216.
- Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., Bosch, J. A., & Thøgersen-Ntoumani, C. (2011). Self-determination theory and diminished functioning: The role of interpersonal control and psychological need thwarting. *Personality and Social Psychology Bulletin, 37*(11), 1459–1473.
- Black, A. E., & Deci, E. L. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. *Science Education, 84*(6), 740–756.
- Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: A 40-year meta-analysis. *Psychological Bulletin, 140*(4), 980–1008.
- Condly, S. J., Clark, R. E., & Stolovitch, H. D. (2003). The effects of incentives on workplace performance: A meta-analytic review of research studies 1. *Performance Improvement Quarterly, 16*(3), 46–63.
- De Cooman, R., Stynen, D., Van den Broeck, A., Sels, L., & De Witte, H. (2013). How job characteristics relate to need satisfaction and autonomous motivation: Implications for work effort. *Journal of Applied Social Psychology, 43*(6), 1342–1352.
- Deci, E. L. (1972). The effects of contingent and noncontingent rewards and controls on intrinsic motivation. *Organizational Behavior and Human Performance, 8*(2), 217–229.
- 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). New York, NY: Academic Press.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum Press.
- 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.
- Deci, E. L., Connell, J. P., & Ryan, R. M. (1989). Self-determination in a work organization. *Journal of Applied Psychology, 74*(4), 580–590.
- Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating internalization: The self-determination theory perspective. *Journal of Personality, 62*(1), 119–142.
- Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin, 125*(6), 627–668.
- Deci, E. L., Olafsen, A. H., & Ryan, R. M. (2017). Self-determination theory in work organizations: The state of a science. *Annual Review of Organizational Psychology and Organizational Behavior, 4*(1), 19–43.
- Delery, J. E., & Roumpi, D. (2017). Strategic human resource management, human capital and competitive advantage: Is the field going in circles? *Human Resource Management Journal, 27*(1), 1–21.
- Gagné, M., & Forest, J. (2008). The study of compensation systems through the lens of Self-Determination Theory: Reconciling 35 years of debate. *Canadian Psychology, 49*, 225–232.
- Gerhart, B., & Fang, M. (2014). Pay for (individual) performance: Issues, claims, evidence and the role of sorting effects. *Human Resource Management Review, 24*(1), 41–52.

- Guay, F., Vallerand, R. J., & Blanchard, C. (2000). On the assessment of situational intrinsic and extrinsic motivation: The Situational Motivation Scale (SIMS). *Motivation and Emotion, 24*(3), 175–213.
- Hennig-Thurau, T., & Paul, M. (2007). Can economic bonus programs jeopardize service relationships? *Service Business, 1*(2), 159–175.
- Hu, L. T., & Bentler, P. M. (1999). Cut off criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55.
- Jenkins, G. D., Jr., Mitra, A., Gupta, N., & Shaw, J. D. (1998). Are financial incentives related to performance? A meta-analytic review of empirical research. *Journal of Applied Psychology, 83*(5), 777–787.
- Krug, M. K., & Braver, T. S. (2014). Motivation and cognitive control: Going beyond monetary incentives. In E. Bijleveld & H. Aarts (Eds.), *The psychological science of money* (pp. 137–162). New York, NY: Springer.
- Kushlev, K., Dunn, E. W., & Lucas, R. E. (2015). Higher income is associated with less daily sadness but not more daily happiness. *Social Psychological and Personality Science, 7*, 1–7. <https://doi.org/10.1177/1948550616657599>.
- Landry, A. T., Kindlein, J., Trépanier, S. G., Forest, J., Zigarmi, D., Houson, D., & Brodbeck, F. C. (2016). Why individuals want money is what matters: Using self-determination theory to explain the differential relationship between motives for making money and employee psychological health. *Motivation and Emotion, 40*, 1–17.
- MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research, 39*(1), 99–128.
- Moller, A. C., & Deci, E. L. (2014). The psychology of getting paid: An integrated perspective. In E. Bijleveld & H. Aarts (Eds.), *The psychological science of money* (pp. 189–211). New York, NY: Springer.
- Olafsen, A. H., Halvari, H., Forest, J., & Deci, E. L. (2015). Show them the money? The role of pay, managerial need support, and justice in a self-determination theory model of intrinsic work motivation. *Scandinavian Journal of Psychology, 56*(4), 447–457.
- Porath, C. L., & Erez, A. (2007). Does rudeness really matter? The effects of rudeness on task performance and helpfulness. *Academy of Management Journal, 50*(5), 1181–1197.
- Putwain, D. W., Kearsley, R., & Symes, W. (2012). Do creativity self-beliefs predict literacy achievement and motivation? *Learning and Individual Differences, 22*(3), 370–374.
- Rosen, C. C., Ferris, D. L., Brown, D. J., Chen, Y., & Yan, M. (2014). Perceptions of organizational politics: A need satisfaction paradigm. *Organization Science, 25*, 1026–1055.
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54–67.
- Ryan, R. M., & Deci, E. L. (2008). Self-determination theory and the role of basic psychological needs in personality and the organization of behavior. In O. P. John, R. W. Robbins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp. 654–678). New York, NY: The Guilford Press.
- Ryan, R. M., Mims, V., & Koestner, R. (1983). Relation of reward contingency and interpersonal context to intrinsic motivation: A review and test using cognitive evaluation theory. *Journal of Personality and Social Psychology, 45*(4), 736–750.
- Soenens, B., Vansteenkiste, M., Duriez, B., & Goossens, L. (2006). In search of the sources of psychologically controlling parenting: The role of parental separation anxiety and parental maladaptive perfectionism. *Journal of Research in Adolescence, 16*, 539–559.
- Stone, D., Deci, E. L., & Ryan, R. M. (2009). Beyond talk: Creating autonomous motivation through self-determination theory. *Journal of General Management, 34*, 75–91.
- Trépanier, S., Forest, J., Fernet, C., & Austin, S. (2015). On the psychological and motivational processes linking job characteristics to employee functioning: Insights from self-determination theory. *Work and Stress, 29*(3), 286–305.
- Van den Broeck, A., Vansteenkiste, M., Witte, H., Soenens, B., & Lens, W. (2010). Capturing autonomy, competence, and relatedness at work: Construction and initial validation of the work-related basic need satisfaction scale. *Journal of Occupational and Organizational Psychology, 83*(4), 981–1002.
- Van den Broeck, A. V., Lance Ferris, D., Chang, C.-H., & Rosen, C. C. (2016). A review of self-determination theory's basic psychological needs at work. *Journal of Management, 42*(5), 1195–1229.
- Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration, 23*(3), 263–280.
- Vansteenkiste, M., Neyrinck, B., Niemiec, C. P., Soenens, B., Witte, H., & Broeck, A. (2007). On the relations among work value orientations, psychological need satisfaction and job outcomes: A self-determination theory approach. *Journal of Occupational and Organizational Psychology, 80*(2), 251–277.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070.
- Weibel, A., Rost, K., & Osterloh, M. (2010). Pay for performance in the public sector—Benefits and (hidden) costs. *Journal of Public Administration Research and Theory, 20*(2), 387–412.