

# Economic stress, emotional contagion and safety outcomes: A cross-country study

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## Abstract.

**BACKGROUND:** Economic instability produced by financial crises can increase employment-related (i.e., job insecurity) and income-related (i.e., financial stress) economic stress. While the detrimental impact of job insecurity on safety outcomes has been extensively investigated, no study has examined the concurrent role of financial stress let alone their emotion-related predictors.

**OBJECTIVE:** The present cross-country research sought to identify the simultaneous effects of affective job insecurity and financial stress in predicting employee safety injuries and accidents under-reporting, and to examine the extent to which emotional contagion of positive/negative emotions at work contribute to the level of experienced economic stress.

**METHODS:** We performed multi-group measurement and structural invariance analyses.

**RESULTS:** Data from employees in the U.S. (N=498) and Italy (N=366) suggest that financial stress is the primary mediator between emotional contagion and poor safety outcomes. Moreover, greater anger-contagion predicted higher levels of financial strain and job insecurity whereas greater joy-contagion predicted reduced economic stress.

**CONCLUSIONS:** Our findings support the relevance of considering the concurrent role of income- and employment-related stressors as predictors of safety-related outcomes. Theoretical and practical implications for safety are discussed in light of the globally increasing emotional pressure and concerns of income- and employment-related economic stress in today's workplace, particularly given the recent pandemic spread of Corona virus disease (COVID-19).

Keywords: Economic stress, emotional contagion, workplace injuries, accident under-reporting

## 1. Introduction

The economic crisis of 2008 produced world-wide economic instability, leading to increased long-term unemployment and, among those fortunate to keep their jobs, greater uncertainty about their future employment prospects [1]. Even prior to the recent global Corona virus (COVID-19) pandemic,

surveyed workers in the United States reported stress about money and place money and work as top economic concerns [2, 3]. Similarly, in Italy, unemployment stands at nearly 12% [4] with 6.9% long-term unemployed and many more engaged in precarious work. According to a recent Eurobarometer [5] survey, 73% of Italian employees rate their working conditions as poor (compared to 43% overall in the EU28) and 85% report conditions have deteriorated over the past five years. The COVID-19 pandemic is certain to only exacerbate economic conditions as evidenced by the staggering 3.3 million jobless claims filed in a single week within the

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U.S. with likely many more to occur in the weeks and months to come.

Given these existing working conditions, the purpose of the current study was to examine the relationship between economic stressors at work and their relationship with work-related safety outcomes in two samples, one from the US and the other from Italy. In doing so, we sought to enhance the conceptual replication [6, 7] of our hypotheses, and increase the generalizability of our findings. Moreover, because employees often share with other people at work their concerns, fears, as well as joys regarding their work situation, we also sought to examine how the sharing of such emotions (i.e., emotional contagion) might be predictive of reported levels of economic stress.

Economic stressors refer to objective and subjective aspects of income and employment that serve as potential stressors to individuals and their families [8]. Potential *employment-related stressors* include job insecurity (a subjective employment stressor regarding one's future employment), whereas *income-related stressors* include variables such as financial stress (a subjective income stressor related to financial concerns and worries) and objective loss of income [9]. Among these economic stressors, multiple research studies indicate that job insecurity predicts a decline in worker safety attitudes and behaviors (e.g., safety motivation and compliance) and an increase in adverse workplace safety outcomes, such as accident under-reporting and injuries [10–12]. This relationship was also demonstrated to be even more critical among temporary workers both in the U.S. and Italy [13].

Taken together, this study has three main aims, each contributing to the extant literature in a unique way. The first aim was to identify the conjoint role of job insecurity and financial stress toward predicting employee safety injuries and accidents under-reporting. Unfortunately, while the relationship between the economic stress of job insecurity and worker safety is becoming clearer, no research to date has examined whether income-related stress has a similar relationship. As a result, little is known about the relationship between other relevant and pervasive economic stressors (such as underemployment and financial stress) and workplace safety outcomes (e.g., accident under-reporting, injuries). Such an omission is critical, since employment- and income-related stressors often co-occur; therefore, failure to include both risks miss specifying their relative importance. Thus, our research responds to recent calls (e.g., [14,

15]) to better understand the contributions of financial stress in conjunction with other economic stressors, such as job insecurity.

The second aim was to provide an empirical examination of the affective dimensions of economic stress, as opposed to the cognitive ones, since they have been found to be stronger predictors of outcomes of economic stress than the cognitive dimensions [16, 17]. Specifically, research indicates that there is an important theoretical distinction between cognitive and affective facets of economic stress. For example, within the job insecurity literature, research indicates that cognitive and affective insecurity are two separate constructs [30]. In particular, cognitive job insecurity is defined as “perceived powerlessness to maintain desired continuity in a threatened job situation” ([18] p. 438), and thus refers to a cognitive awareness of the possibility of job loss (although not necessarily any given level of distress at the prospect). Conversely, affective job insecurity is the emotional experience of being emotionally anxious about these potential losses [15]. Similarly, perceived financial inadequacy is the cognitive judgement of a lack of financial resources, whereas perceived financial stress represents the affective reaction to that inadequacy. In the current study we go beyond the well-established study of employment-related stressors (i.e., job insecurity) by adding the underexplored area of income-related stressors (i.e., financial stress).

The third aim was to examine whether and to what extent emotional contagion of positive/negative emotions at the workplace may play a role in increasing or decreasing experienced levels of economic stress (i.e., job insecurity, financial stress) and safety outcomes. Specifically, emotional contagion is the automatic and unintentional tendency of humans to absorb emotional cues of another individual, thus converging emotionally on the same affective experience [19]. As such, emotional contagion involves implicit processes through which the emotion is interpersonally induced [20], and a primary mechanism through which emotions are shared and become social [21].

Given the focus of the current study on the affective dimensions of economic stress (i.e., affective job insecurity, financial stress), we argue that they are most likely to be influenced by emotional contagion at work. Specifically, the current study goes beyond the study of affect-related factors that occur solely within the individual (e.g., anxiety) and focuses on emotional contagion as an emotion-related factor with a strong social component which can influence both

the experience of stress at work (e.g., job burnout, [22]) and relevant safety outcomes (i.e., workplace injuries, accidents). Understanding emotional contagion as an antecedent of economic stress and safety outcomes is important because it would allow us to develop effective emotion management interventions including knowledge on how social interactions contribute to shape emotional life of employees and their subsequent feelings of economic stress and likelihood of experiencing accidents/injuries at work.

In the sections below, we review the literature and develop our hypotheses on the relationship between economic stress, emotional contagion and safety outcomes.

### 1.1. Employment-related economic stress and safety outcomes

Job insecurity is best described as a subjective phenomenon that is “in the eye of the beholder” (e.g. [10, 23]), and can also be referred to the perceived likelihood of losing one’s job [24]. As such, it refers to a potential subjective economic stressor related to individual’s employment status [9]. Numerous studies have demonstrated that employees with insecure jobs increase risk taking behaviors at work [25], and suffer more injuries and accidents compared to employees with relatively more secure jobs (i.e., [26, 27]). This relationship has also been replicated across different national contexts and labor markets. More specifically, research [12] has established that when employees feel their job to be more insecure they not only experience more accidents at work, but also tend to not report those accidents to appropriate company officials. Hence, higher levels of job insecurity are related to greater accident underreporting (i.e., discrepancies between the number of accidents experienced and the number reported).

A relevant contribution in understanding the link between job insecurity and safety outcomes was Borg and Elizur’s [28] distinction between the affective versus cognitive nature of job insecurity. As noted above, employees’ beliefs about perceived threats to future stability of their job reflects the cognitive component of job insecurity whereas the emotional state and reaction to the subjective anticipation of such an involuntary event reflects the affective component [29]. As such, affective job insecurity refers to concerns and worries regarding potential job loss.

Research has shown that not only there is a difference between cognitive and affective job insecurity [30], but that is the affective component that tend to

be more proximally related to poor safety outcomes of our interest [16, 17]. Despite this well-established conceptual difference, a large number of studies continue to either overlook affective job insecurity or conflate the two in their operationalization [31]. Moreover, while the relevance of differentiating between cognitive vs. affective job insecurity has been widely acknowledged, research on the impact of affective job insecurity on workplace injuries and accident under-reporting is still scarce. Recently, Jiang and Probst [32] found that affective job insecurity predicted higher rates of workplace accidents among 639 employees from six different companies. Consistent with the above arguments, we expect to find the following:

*Hypothesis 1:* Affective job insecurity positively predicts the levels of workplace injuries (1a) and accident under-reporting (1b).

### 1.2. Income-related economic stress and safety outcomes

Similar to the cognitive vs. affective components of job insecurity, financial stress refers to the distressed emotional reaction associated with individuals’ perceived likelihood of the occurrence of unwanted and threatening events related to income loss and financial difficulties. While research on job insecurity has a long tradition, studies on financial stress, and particularly on the link with workplace safety, are still nascent. Moreover, as is the case within much of the job insecurity literature, extant measures of financial stress (e.g., [33, 34]) still tend to contain both cognitive (i.e., beliefs, judgements) and affective (i.e., feelings, concerns) items. Such operational conflation of the two aspects also makes it difficult to tease out their effects and differential predictors. Therefore, for the purpose of the current study, we developed a measure of affective financial stress which captures emotional and attitudinal reactions to potential financial inadequacy.

Present research on income and economic deprivation has shown links with poorer health and psychological well-being. For example, the finances-shame model [35] suggests that financial hardship combined with the shame associated with financial hardship leads to adverse health outcomes. Despite some evidence of the impact of economic deprivation on job attitudes and performance [36], there is still scant financial research specifically on occupational health [14], let alone on how economic stress (e.g., perceived financial stress) apply to organizational

250 contexts and safety-related outcomes in particular.  
251 However, based on the above arguments, we have  
252 reason to expect the following:

253 *Hypothesis 2:* Financial stress positively predicts  
254 the levels of workplace injuries (2a) and accident  
255 under-reporting (2b).

### 256 1.3. Emotional contagion at work, economic 257 stress, and safety outcomes

258 Affective economic stress represents an adverse  
259 emotional reaction to environmental pressures related  
260 to employment and income sources of uncertainty.  
261 According to Clark, Knabe, and Rätzel [37], poor  
262 economic conditions increase the prevalence of  
263 unemployment within communities, thereby increas-  
264 ing individuals' perceptions of the likelihood that  
265 they will lose their job. In other words, economic  
266 stress is contagious. Indeed, research indicates that  
267 individual perceptions of job insecurity are "conta-  
268 gious" and can create a workplace climate of job  
269 insecurity [38].

270 Emotional contagion (EC; [39]) is the noncon-  
271 scious process through which humans automatically  
272 detect emotions of those with whom they relate, thus  
273 allowing absorption of the same emotion [40]. Peo-  
274 ple tend to mimic the facial, vocal, postural, and  
275 behavioral emotional cues "of those around them, and  
276 thereby "catch" others' emotions as a consequence  
277 of such facial, vocal, and postural feedback" ([39]  
278 p.3). Thus, it refers to an individual experience of  
279 emotion that includes the interpersonal component  
280 of the feelings exchanged during social encounters  
281 [39]. The simultaneous detection and reflection of  
282 the emotional cues of others occurs below conscious  
283 recognition and is enabled by the Mirror Neuron  
284 System mimicking the brain activation pattern under-  
285 lying an emotional stimulus [41, 42]. Although  
286 emotional contagion is activated involuntarily and  
287 automatically, the neocortex receives the emotional  
288 signal milliseconds thereafter thus enabling the con-  
289 scious awareness of one's emotional exchanges with  
290 others [43]. As such, emotional contagion involves  
291 "epidemic" spreading of emotions in large social  
292 communities [44] and among all people interacting  
293 at work [45].

294 While emotional contagion has an inherent social  
295 component, it can be studied [21], and consistently  
296 operationalized, at the individual (e.g., being prone to  
297 catching other people's emotions, [19], dyadic (e.g.,  
298 emotional exchanges between: salespersons and cus-  
299 tomers; teachers and students, [46]), and group level

(e.g., affect transfer among group members,). The  
300 present paper engages an individual-level perspective  
301 of emotional contagion, understood as the individ-  
302 ual's experience of feeling an emotion that s/he  
303 has absorbed from other people while interacting  
304 in the workplace. Furthermore, it focuses on the  
305 absorption of specific basic emotions, as proposed  
306 by Doherty [47], rather than measuring an individual  
307 general susceptibility to pick a mix of others' affec-  
308 tive clues, such as emotions, feelings, moods [40].  
309 We purposefully focus on the contagion of basic,  
310 discrete emotions because basic emotions are univer-  
311 sal features of all humans [48], thus increasing the  
312 likelihood of generalizability of the research find-  
313 ings and applications. Finally, in the current study  
314 we conceptualize emotional contagion at work as  
315 emotional exchanges contextualized to work settings,  
316 rather than in various situations of an individual's life  
317 [47, 40].  
318

319 Indeed, emotional contagion is a predictor of stress  
320 associated with work [22]. More specifically, consis-  
321 tent with the Job Demands-Resource (JD-R) model  
322 of work-related stress [49], a study from Petitta, Jiang  
323 and Hartel [50] in healthcare settings found that con-  
324 tagion of anger may serve as a job demand that  
325 is related to increased job burnout (i.e., job stress)  
326 whereas contagion of joy may serve as a job resource  
327 that is related to reduced burnout.

328 While a job resource is an objective or subjective  
329 aspect of the job that stimulates and energizes the  
330 individual in achieving one's goal, a job demand is an  
331 objective or subjective aspects that requires sustained  
332 physical and/or psychological effort [51]. Moreover,  
333 both job demands and job resources have cognitive,  
334 emotional, and physical components [52, 53]. The  
335 current study focuses on the emotional domain of  
336 job demands, which refer to emotionally taxing work  
337 requests, and the emotional aspect of job resources,  
338 which reduce the emotional pressure associated with  
339 work. As such, contagion of positive emotions (e.g.,  
340 joy) may serve as a job resource by synchronizing  
341 opportunities, social bonding, and cooperation [54].  
342 Conversely, contagion of negative emotions (e.g.,  
343 anger) may have detrimental consequences and thus  
344 qualifies as a job demand by depleting psychological  
345 resources [55]. Consistently, we have reason to expect  
346 that contagion of joy and anger among people in orga-  
347 nizations contribute to the cross-over of work-related  
348 economic stress (i.e., financial stress and affective job  
349 insecurity).

350 Using the JD-R model of work-related stress and  
351 emotional contagion literature as a theoretical foun-

352 dation, we test the proposition that higher contagion  
 353 of anger (i.e., a demand) will be associated with  
 354 greater levels of subsequent affective job insecurity  
 355 and financial stress, while higher contagion of joy  
 356 (i.e., a resource) will be associated with lower lev-  
 357 els of affective job insecurity and financial stress.  
 358 Furthermore, literature [56] suggests that negative  
 359 emotions (i.e., anger, frustration, anxiety) narrow  
 360 employees' attention and subsequent carrying out of  
 361 work in a safe manner, thus increasing the number  
 362 of accidents they experience. For example, Dunbar  
 363 [57] found that anxiety was related to reductions  
 364 in employee use of personal protective equipment.  
 365 Similarly, negative emotions may narrow percept-  
 366 tual focus thus causing individuals to miss important  
 367 performance-related cues and act without consider-  
 368 ing the consequences of their actions [58]. Indeed,  
 369 literature suggests that work-related stress is a signifi-  
 370 cant safety concern [59]. In the current study, we  
 371 expect a similar effect such that the contagion of  
 372 anger (i.e., a demand) will interfere with employees  
 373 energies and lead them to experience more work-  
 374 place injuries as well as refrain from reporting to  
 375 appropriate safety officers the accidents they expe-  
 376 rience (i.e., accident underreporting). Accordingly,  
 377 we argue that contagion of joy (i.e., a resource) will  
 378 energize employees and help them to experience less  
 379 workplace injuries as well as encourage them to  
 380 report the accidents they experience.

381 As a result, we have reason to expect that:

382 *Hypotheses 3 & 4:* Emotional contagion of joy  
 383 absorbed from others directly and negatively predicts  
 384 affective job insecurity (3a) and financial stress (3b),  
 385 whereas emotional contagion of anger absorbed from  
 386 others directly and positively predicts affective job  
 387 insecurity (4a) and financial stress (4b).

388 *Hypotheses 5 & 6:* Emotional contagion of joy  
 389 absorbed from others negatively predicts (5a) work-  
 390 place injuries and (5b) accident under-reporting, both  
 391 directly and indirectly via affective job insecurity  
 392 and financial stress. Emotional contagion of anger  
 393 absorbed from others positively affects (6a) work-  
 394 place injuries and (6b) accident under-reporting, both  
 395 directly and indirectly via affective job insecurity and  
 396 financial stress.

397 Literature suggests that workplace aggression is  
 398 likely to thrive in environments where job insecur-  
 399 ity is high due to co-workers being seen as potential  
 400 rivals and leaders not emphasizing civility as a pri-  
 401 ority during turbulent times [60]. Indeed, previous  
 402 research [50] found that interpersonal interactions at  
 403 work might play an influential role in respondents'

404 levels of joy and anger absorbed. In line with emo-  
 405 tional contagion theory's claim that the absorption of  
 406 an emotion is grounded in social exchanges, we have  
 407 reason to predict that social interactions with differ-  
 408 ent stakeholders at work (e.g., leaders, colleagues)  
 409 will contribute to produce different absorption levels  
 410 of joy or anger. Specifically, anger and joy absorbed  
 411 from leaders and from colleagues predict the level of  
 412 contagion of anger and joy respectively, and, in turn,  
 413 levels of work-related stress (i.e., burnout). Building  
 414 on these premises, we expect that:

415 *Hypotheses 7 & 8:* Joy associated respectively with  
 416 leaders (7a), and colleagues (7b), directly and pos-  
 417 itively predicts the levels of joy absorbed. Anger  
 418 associated respectively with leaders (8a), and col-  
 419 leagues (8b), directly and positively predicts the  
 420 levels of anger absorbed.

421 *Hypotheses 9 & 10:* Joy associated respectively  
 422 with leaders (9a) and colleagues (9b), indirectly  
 423 and negatively predict workplace injuries and acci-  
 424 dent under-reporting via emotional contagion of  
 425 joy, affective job insecurity and financial stress.  
 426 Anger associated respectively with leaders (10a) and  
 427 colleagues (10b) indirectly and positively predict  
 428 workplace injuries and accident under-reporting via  
 429 emotional contagion of anger, affective job insecurity  
 430 and financial stress.

## 431 2. Method

### 432 2.1. Participants and procedure

433 In order to test our hypotheses, data were gathered  
 434 from employees within the US and Italy.

435 *US Sample.* Online anonymous surveys were  
 436 administered to 498 participants in the United States.  
 437 The demographics of the sample description are  
 438 reported in Table 1.

439 After providing participants with informed con-  
 440 sent materials that explained the anonymous nature  
 441 of the data collection and their rights as research par-  
 442 ticipants, employees completed the on-line survey  
 443 containing the research measures through Amazon  
 444 Mechanical Turk, an online crowd sourcing website.

445 *Italian Sample.* Paper and pencil surveys were  
 446 administered in person to 366 participants in Italy.  
 447 The demographics of the sample description are  
 448 reported in Table 1.

449 Members of the research team provided partici-  
 450 pants with informed consent materials that explained  
 451 the anonymous nature of the data collection and their

Table 1  
Demographics of the US and Italian samples

Variable		%	Range	Mean	SD
<i>US sample (N = 498)</i>					
1. Gender	Male	55%			
	Female	44%			
2. Contract	Permanent	84%			
	Contingent	16%			
3. Age				35.1 yrs.	10.5
4. Organizational tenure				5.4 yrs.	
5. Total Household Income				62,049.91 \$	37,622.76
6. Household members			1–8 persons	2.67 persons	1.4
<i>Italian sample (N = 366)</i>					
1. Gender	Male	45.6%			
	Female	54.5%			
2. Contract	Permanent	15%			
	Contingent	85%			
3. Age				31.9 yrs.	11.3
4. Organizational tenure				5.3 yrs.	6.8
5. Total Household Income				24,224.20 €	18,311.71 €
6. Household members			1–7 persons	3 persons	1.2

rights as research participants, and distributed the questionnaire. Employees were allowed to complete the survey at home and return it in a sealed envelope, in order to assure confidentiality, to the research team.

## 2.2. Measures

The US and Italian versions of the survey contained the following scales, respectively worded in English and Italian:

**Accidents Under-reporting.** Using a measure from Probst, Graso, Estrada, and Greer, [61], employees were asked to indicate how many safety accidents they reported to appropriate company officials and how many accidents they had experienced but not reported to their supervisor over the past 12 months. Using these data, we could compute the total number of experienced accidents for comparison to the number actually reported. Although the workplace accident variables are self-report in nature, previous studies do indicate that self-report measures of accidents and unsafe behaviors are related to independent observations of these variables [62].

**Workplace Injuries.** We used a 15-item self-report measure of workplace injuries [61] experienced during past year (e.g., back injury, cut/puncture wound, broken bone, eye irritation). Workplace injuries were assessed by totalling the number of injuries workers indicated they had experienced as a result of their job, and could range from 0 to 12.

**Affective job insecurity.** Six items from Probst's [17] measure of affective job insecurity (the Job Security Satisfaction scale) were used to assess

the respondent's feelings and evaluative assessment about his or her job security. Respondents indicated on a 3-point scale (yes, don't know, no) the extent to which each adjective or phrase described the stability of their job. A sample item is "upsetting how little job security I have." Using a scoring system recommended by Hanisch [63], item responses were coded as follows: agreement with negatively worded items (i.e., "nerve-wracking") was scored 3; agreement with positively worded items (i.e., "looks optimistic") was scored 0; and "don't know" responses were scored 2. Hence, higher scores reflected greater affective job insecurity.

**Affective Financial stress.** We used four Likert scale items developed by the second author of the present paper to assess the affective nature of financial stress based on a prior Delphi study [64] that identified common themes associated with financial stress. Respondents indicated on a 5-point frequency scale ranging from 1 (*Never*) to 5 (*Always*) how often they experienced concerns and worries related to stressful economic situations. Items included: "I worry about having the funds to cover normal monthly expenses"; "I feel like I am living paycheck-to-paycheck"; "I am stressed by my financial situation"; and "An unexpected event such as a car repair could cause a financial emergency for me."

**Emotional Contagion.** Emotional contagion from the perspective of basic and discrete emotions absorbed by the respondent (i.e., EC absorbed) at the workplace was measured by the Emotional Contagion at Work Scale (ECWS; [45]). Previous findings support the empirical distinctiveness of con-

516 tagion of the two discrete basic emotions assessed  
517 in this research, namely, joy and anger [45]. The  
518 ECWS assesses emotional contagion by present-  
519 ing respondents with items that represent different  
520 work-situated emotional experiences. For example, a  
521 sample item from the 4-item joy-absorbed subscale is,  
522 “Interacting with happy people makes me feel better  
523 when I am a little down”, and a sample item from the  
524 4-item anger-absorbed subscale is, “When someone is  
525 angry and raises their voice, I become irritated.” For  
526 each item participants receive two separate prompts.  
527 The first prompt asks participants to answer how  
528 frequently the emotional situation is experienced  
529 using a 5-point Likert scale ranging from 1 (*Never*)  
530 to 5 (*Always*). The second prompt asks partici-  
531 pants to indicate with whom the described emotional  
532 situation happens by selecting the applicable stake-  
533 holders: leaders and colleagues. For this latter scale,  
534 responses were coded “0”/“1” depending on whether  
535 the emotional experience was respectively NOT asso-  
536 ciated/associated with the stakeholder.

537 The scale format allowed us to compute two dif-  
538 ferent scores. First, we computed the overall scores  
539 of joy-absorbed and anger-absorbed by averaging  
540 the selected frequency of the joy-related and anger-  
541 related items respectively. Higher scores of “joy  
542 absorbed” and “anger absorbed” reflect greater levels  
543 of joy and anger being absorbed from others at work.  
544 The second response scale allowed us to compute  
545 the average scores on the following four dimensions:  
546 1) joy-absorbed from leaders; 2) joy-absorbed from  
547 colleagues; 3) anger-absorbed from leaders; and 4)  
548 anger-absorbed from colleagues. For example, we  
549 computed the overall scores of joy-absorbed from  
550 leaders by averaging the answers (0/1 response) to  
551 the four items of joy-absorbed-leaders.

### 552 3. Statistical procedures

553 We first assessed the measurement invariance of the  
554 English and Italian version of the study scales. All  
555 models were carried out with M plus 8 [65] using the  
556 weighted least squares—mean and variance adjusted  
557 (WLSMV) estimation given the ordered categorical  
558 nature of our items which are evaluated by Likert-type  
559 answer formats [66]. We first performed separate con-  
560 firmatory factor analyses (CFA) for the US and Italian  
561 samples, and evaluated the indices of goodness of  
562 fit to the data [67]. Second, we used the multiple-  
563 group confirmatory factor analysis (MG-CFA) to test  
564 and compare progressively more constrained models

565 in order to assess the following measurement invari-  
566 ance: configural (equality for form with no invariance  
567 constraints on parameters), metric (equality for fac-  
568 tor loadings), scalar (equality for items’ thresholds),  
569 and strict (residual variances). Using the procedure  
570 proposed by Cheung and Rensvold [68], one can con-  
571 clude that the additional constraints are appropriate  
572 and can be maintained if the model’s chi-square does  
573 not change significantly and the decrease in Compar-  
574 ative Fit Index (CFI) between adjacent nested models  
575 is less than 0.01. When there is some support for  
576 measurement invariance, structural invariance can be  
577 examined. In accordance with Kline [67], we fol-  
578 lowed three steps. First, we examined separately the  
579 relative fit of a structural regression model for the  
580 U.S. and Italian samples. Second, we performed a  
581 single analysis across both groups without any con-  
582 straints and by taking into account the highest level  
583 of measurement invariance reached in measurement  
584 invariance. Third, we tested the equality of struc-  
585 tural path coefficients across groups by comparing  
586 this model with the former. Finally, we bootstrapped  
587 10,000 times estimates from the final structural model  
588 [69] in order to assess the magnitude and the signifi-  
589 cance of the specific indirect effects, by interpreting  
590 their standardized estimates along with the associated  
591 95% confidence intervals.

## 592 4. Results

### 593 4.1. Descriptive statistics and correlations

594 The means, standard deviations, reliability esti-  
595 mates, and zero-order correlations among the study  
596 variables were calculated separately for the US and  
597 Italy sub-samples. As shown in the diagonal of  
598 Table 2, each study variable meets the criterion for  
599 internal consistency reliability, ranging from 0.82 to  
600 0.93 in the U.S. and 0.77 and 0.93 in Italy. While  
601 the pattern of correlations was similar across the  
602 two countries, Italian workers exhibited significantly  
603 higher means than US workers on financial stress,  
604 affective job insecurity and emotional contagion of  
605 anger, and a significantly lower mean on workplace  
606 injuries; differences were examined with Student’s t  
607 for independent samples and they were all significant  
608 at  $p < 0.001$ . The means of accident under-reporting  
609 and emotional contagion of joy were not statistically  
610 different. We will consider these differences further  
611 in the results section in light of the measurement  
612 invariance results.

Table 2  
Descriptive statistics, correlations, and reliabilities

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. Injuries	2.74 (1.97)	2.61 (2.28)	–	0.27***	0.22***	0.11*	0.07	0.03	-0.01	0.19***	0.08	0.03
2. Accident Under-reporting	0.18 (0.14)	0.33 (0.33)	0.24***	–	0.17**	0.09	-0.08	0.004	0.01	-0.04	0.02	0.08
3. Financial stress	2.70 (3.0)	1.22 (1.19)	0.26***	0.17***	–	0.34***	-0.04	0.03	0.004	0.09	0.06	0.05
4. Affective Job Insecurity	0.88 (1.66)	0.99 (0.93)	0.19***	0.17***	0.93 (0.93)	–	-0.07	-0.06	-0.04	0.11*	0.03	-0.02
5. Emotional Contagion Joy	3.55 (3.59)	0.97 (0.91)	0.02	-0.07	0.43***	0.87 (0.77)	–	0.21**	0.15**	0.40***	0.17**	0.16**
6. Joy Absorbed by Leader	0.81 (0.43)	0.30 (0.39)	-0.09	-0.09	-0.10*	-0.20***	0.47***	–	0.26***	0.02	0.52***	0.29***
7. Joy Absorbed by Colleagues	0.87 (0.84)	0.25 (0.28)	-0.08	-0.12*	-0.04	-0.11*	0.39***	0.67***	–	0.01	0.30***	0.52***
8. Emotional Contagion Anger	2.38 (2.78)	0.92 (0.97)	0.33***	0.16***	0.36***	0.24***	0.13**	-0.06	0.80 (0.74)	–	0.23**	0.21***
9. Anger Absorbed by Leader	0.61 (0.55)	0.37 (0.40)	0.18***	0.08	0.15**	0.08	0.01	0.21***	0.28***	0.86 (0.80)	–	0.29***
10. Anger Absorbed by Colleagues	0.46 (0.66)	0.39 (0.36)	0.15**	-0.03	0.18**	0.16**	0.11*	0.12*	0.15**	0.41***	0.40***	–

Note. Mean, SD and reliability for Italy are in parentheses; Reliability estimates are on the diagonal; Correlations below the diagonal are for the U.S.A. and correlations above the diagonal are for Italy. \* $p < 0.05$ , \*\* $p < 0.01$ .

#### 4.2. Goodness of fit for the measurement models of the single groups

Prior to conducting multiple-group analyses for testing our hypotheses, we examined the goodness-of-fit values of the four-factor CFA models separately for the US and Italy samples. The values for the US sample (see Table 3) were  $\chi^2(129, N=498) = 224.710$ , RMSEA = 0.039 (0.030–0.047), CFI = 0.98, TLI = 0.98, showing an excellent fit. Each indicator had statistically significant ( $p < 0.001$ ) factor loadings on its assigned construct, with all standardized values greater than 0.69. Similarly, the fit indices for the Italian sample were  $\chi^2(129, N=357) = 200.146$ , RMSEA = 0.039 (0.028–0.050), CFI = 0.94, TLI = 0.93, thus indicating an excellent fit. Further, each indicator had statistically significant ( $p < 0.001$ ) factor loadings on its assigned construct, with all standardized values greater than 0.63.

Correlations among emotional contagion (i.e., joy, anger) and economic stress (i.e., financial stress, affective job insecurity) factors ranged from -0.10 to 0.41 in the US and from -0.05 to 0.48 in Italy. On the other hand, correlations between financial stress and affective job insecurity was 0.49 in the US and 0.41 in Italy. These results demonstrated the appropriateness of the four hypothesized latent factors and the distinctiveness of emotional contagion factors (i.e., joy and anger), financial stress, and affective job insecurity.

#### 4.3. Multiple group CFA analyses for measurement invariance across the US and Italy

Table 3 shows the results of analyses for measurement invariance testing across the US and Italy. We used the DELTA parameterization (see [65]). Since unique variances are not locally identified in the configural model, they were fixed to unity in both groups (i.e., US, Italy) for each measurement invariance model (i.e., M1, M2, M3, M4). When constraints on factor loadings were added to test for metric invariance, the model (M2) still showed an excellent fit, and the  $\Delta CFI$  was less than 0.01 in comparison to the configural model (M1). When constraints on thresholds were introduced to test for scalar invariance, the model (M3) still showed an excellent fit but did not satisfy the full scalar condition. Thus, after realising four thresholds pertaining to one item of emotional contagion of anger, partial scalar invariance (M4) was reached. Hence, there was an overall good evidence



Table 3  
Results of tests for measurement and structural invariance across U.S. and Italy

Models(M)	$\chi^2$	df	Model Fit			Model Difference	
			RMSEA (90% CI)	CFI	TLI	$\Delta M$	$\Delta CFI$
Model <sub>U.S.</sub>	479.051	201	0.053 (0.047–0.059)	0.981	0.978	–	–
Model <sub>Italy</sub>	373.417	201	0.048 (0.041–0.056)	0.982	0.979	–	–
M1: Configural	853.887	402	0.051 (0.046–0.056)	0.981	0.979	–	–
M2: Metric	936.372	416	0.054 (0.049–0.058)	0.979	0.976	M1–M2	0.002
M3: Scalar	1273.711	472	0.063 (0.059–0.067)	0.967	0.968	M2–M3	0.012
M4: Partial Scalar	1187.585	468	0.060 (0.055–0.054)	0.970	0.971	M2–M4	0.009
S5: Structural Model for U.S.	380.228	233	0.036 (0.029–0.042)	0.975	0.971	–	–
S6: Structural Model for Italy	306.969	233	0.030 (0.020–0.039)	0.946	0.936	–	–
S7: Unconstrained Structural Model across groups	1208.535	540	0.054 (0.050–0.058)	0.972	0.972	–	–
S8: Constrained Structural Model across groups	1212.223	556	0.053 (0.049–0.057)	0.973	0.973	S7–S8	–0.001

Note. At each step in the sequence of invariance tests, all earlier constraints remain in place (excepting for M4, where we released four constraints with respect to M3). RMSEA = Root Mean-Square Error of Approximation; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index.

of no substantial item bias in the data, indicating that scale means of the contagion of joy, contagion of anger, financial stress, and job insecurity measures can be meaningfully compared across countries also at the observed level.

#### 4.4. Multi group structural equation models

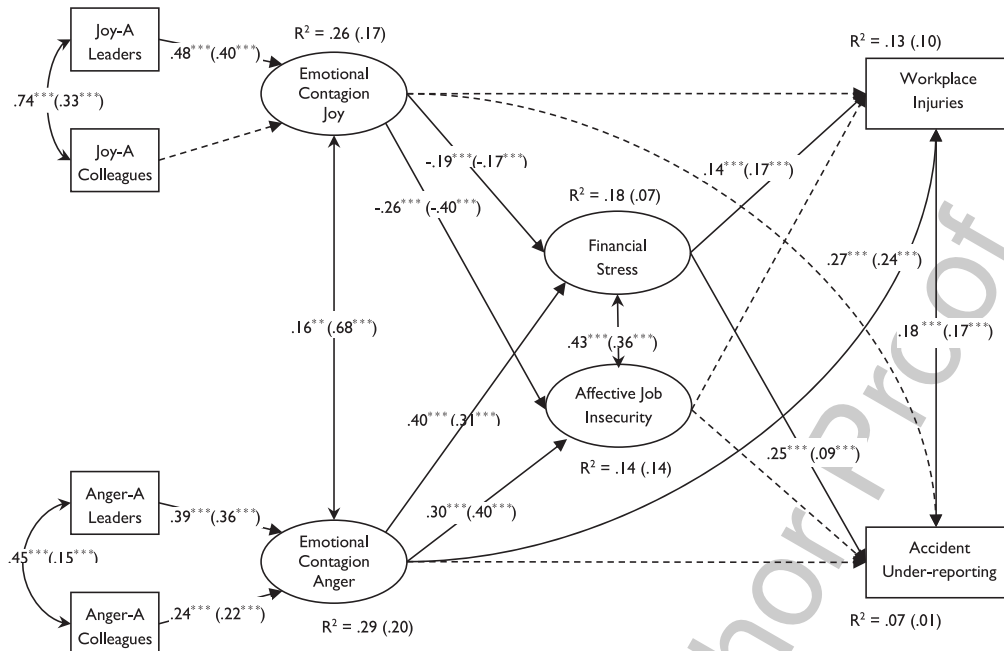
In the first step, we examined separately the goodness-of-fit values for the structural equation models for the US and Italy. As shown in Table 3, the values for both the US (S5) [ $\chi^2_{(df=233)} = 380.228$ , RMSEA = 0.036 (0.029–0.042), CFI = 0.98, TLI = 0.97] and Italy (S6) [ $\chi^2_{(df=233)} = 306.969$ , RMSEA = 0.030 (0.020–0.039), CFI = 0.95, TLI = 0.94] model showed good fit to the data.

Results from the subsequent comparison of single analysis across both US and Italy without any constraints (model S7 in Table 3) and with constrained imposed (S8) showed that here was not a significant decrement in model fit, thus supporting an invariant pattern of relationships among variables across the US and Italy. The final best fitting model is presented in Fig. 1.

As can be seen, financial stress exerted a positive effect on workplace injuries (respectively, 0.14,  $p < 0.01$ , for the US, and 0.17,  $p < 0.01$ , for Italy) and

on accident under-reporting (0.25,  $p < 0.01$  for the US and 0.09,  $p < 0.01$  for Italy). However, affective job insecurity did not exert a significant effect on workplace injuries or on accident under-reporting (both for the US and Italy). Thus, across both the US and Italy, Hypotheses 2a and 2b on the effect of financial stress on safety outcomes (i.e., workplace injuries and accident under-reporting) were supported whereas Hypotheses 1a and 1b on the effect of affective job insecurity on safety outcomes were not. Moreover, financial stress showed a positive correlation with affective job insecurity (0.43,  $p < 0.01$  for the US and 0.36,  $p < 0.01$  for Italy), while workplace injuries showed a positive correlation with accident under-reporting (0.18,  $p < 0.01$  for the US and 0.17,  $p < 0.01$  for Italy).

Emotional contagion of joy exerted a negative effect on financial stress (–0.19,  $p < 0.01$  for the US and –0.17,  $p < 0.01$  for Italy) and on affective job insecurity (–0.26,  $p < 0.01$  for the US and –0.40,  $p < 0.01$  for Italy). Further, contagion of joy did not exert a significant effect on workplace injuries or on accident under-reporting. Thus, only Hypotheses 3a and 3b referring to the effect of contagion of joy on economic stress were supported, whereas Hypotheses 5a and 5b referring to contagion of joy and safety outcomes were not.



Note. \*\*\*  $p < .001$ , \*\*  $p < .01$ ; dotted lines are statistically non-significant estimates.

Fig. 1. Standardized structural coefficients for the final structural model for the U.S.A. and Italy (in parentheses). Note. \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ ; dotted lines are statistically non-significant estimates.

Emotional contagion of anger exerted a positive effect on financial stress (0.40,  $p < 0.01$  for the US and 0.31,  $p < 0.01$  for Italy) and on affective job insecurity (0.30,  $p < 0.01$  for the US and 0.40,  $p < 0.01$  for Italy). Further, contagion of anger exerted a significant positive effect on workplace injuries (0.27,  $p < 0.01$  for the US and 0.24,  $p < 0.01$  for Italy) whereas did not exert any significant effect on accident under-reporting (both for the US and Italy). Thus, Hypotheses 4a and 4b on the effect of contagion of anger on economic stress were supported. Further, Hypothesis 6a on the effect of contagion of anger on workplace injuries was supported whereas Hypothesis 6b referring to accident under-reporting was not.

Further, joy absorbed from leaders, but not from colleagues, positively predicted emotional contagion of joy (0.48,  $p < 0.01$  for the US and 0.40,  $p < 0.01$  for Italy). Anger absorbed from leaders positively predicted emotional contagion of anger (0.39,  $p < 0.01$  for the US and 0.36,  $p < 0.01$  for Italy). Similarly, anger absorbed from colleagues positively predicted emotional contagion of anger (0.23,  $p < 0.01$  for the US and 0.22,  $p < 0.01$  for Italy). These findings provide near complete support for Hypotheses 9 and 10, with the exception of Hypothesis 9b referring to anger absorbed from colleagues.

Finally, when considering the bootstrapped specific indirect effects for the US model, emotional contagion of joy exerted a negative effect only on accident under-reporting (-0.02, -0.045 - -0.001) via financial stress. Emotional contagion of anger exerted a positive effect on both workplace injuries (0.06, 0.013 - 0.111) and accident under-reporting (0.06, 0.010 - 0.117) via financial stress. When considering the indirect effects of emotional contagion sources, anger absorbed by colleagues exerted a positive effect (0.02, 0.001 - 0.036) on accident under-reporting via contagion of anger and financial stress. Further, anger absorbed by colleagues exerted a positive effect on workplace injuries via contagion of anger (0.08, 0.039 - 0.127) and via contagion of anger and financial stain (0.02, 0.002 - 0.034). The indirect effects of anger absorbed from leaders on accident under-reporting via contagion of anger and financial stress was significant and positive (0.03, 0.006 - 0.043). Further, anger absorbed by leaders exerted a positive effect on workplace injuries via contagion of anger (0.11, 0.063 - 0.161), and via contagion of anger and financial stain (0.02, 0.004 - 0.044). Finally, for the Italian model, emotional contagion of anger exerted a specific indirect positive effect on workplace injuries (0.04, 0.003 - 0.078) and accident under-reporting

(0.07, 0.001–0.136) via financial stress. Overall, the model explained the 13% of workplace injuries variance in the US and 10% in Italy, and 7% of accident under-reporting variance in the US and 1% in Italy.

## 5. Discussion

Workers in the United States annually experience nearly 3 million work-related injuries and illnesses [70], with over half being serious enough to require time away from work. In Italy, 468,698 work-related injuries occur according to INAIL (Italian National Workers Compensation Authority; [71]). Despite the growing body of evidence on job insecurity predicting poor safety outcomes (e.g., injuries, accidents under-reporting), no research to date has examined whether these effects might differ when simultaneously examining other economic stressors, such as financial stress. The current cross-country (i.e., Italy, US) study fills this gap by investigating the differential role of employment- and income related stressors (i.e., financial stress, affective job insecurity) in predicting employee injuries and accident under-reporting. Furthermore, the study explores the concomitant effects of workplace contagion of both positive and negative emotions (i.e., joy, anger) on the perceived levels of economic stressors as well as the occurrence of poor safety outcomes.

Our findings suggest that financial stress is the primary mediator between emotional contagion and poor safety outcomes, thus highlighting the importance of considering not only employment-related stressors (e.g., affective job insecurity) but also income-related stressors (e.g., financial stress). Specifically, when taking into account both types of economic stressors, our results suggest that financial stress may be the more operative stressors explaining both safety outcomes. Hence, when employees are worried about the adequacy of their income, they not only experienced more injuries at work, but also tended to not report the accidents they experienced to appropriate company officials. Notably, these results are consistent (i.e., invariant) across different cultural contexts and also across different samples composition in terms of employment status (i.e., a majority of permanent workers in the US sample as opposed to a majority of contingent workers in the Italian one). Furthermore, results showed that the levels of both financial stress and affective job insecurity were increased by the contagion of anger whereas contagion of joy contributed to reduce the perception

of economic stressors. This appears to be particularly relevant during the current pandemic spread of Corona virus disease (COVID-19) which renders safety of workers a major concern under the effects of such economic stressors and the emotional pressure shared among people (i.e., emotional contagion is intertwined with the medical contagion in the spreading of the disease). Additionally, as evidenced by the recent spikes in unemployment claims, financial and job insecurity will be of increasing concern to the point of affecting the medical crisis management strategies engaged by the many nations progressively involved in the pandemic.

Finally, our findings on the role of different social sources of contagion at work (i.e., leaders, colleagues) suggest that particularly relationships with leaders are the most relevant social paths in enhancing circulation of both joy and anger, thus stressing the relevance of leaders as a key role in our conceptual model of economic stressors and safety outcomes.

### 5.1. Theoretical implications

Together, our cross-country findings on how contagion of positive vs. negative emotions at work shape employee perception of economic stressors and subsequent poor safety outcomes make several novel contributions to the extant literatures in different areas – economic stress, safety, and emotional contagion. Most notably, we add knowledge to the economic stress and safety outcomes literatures by incorporating the study of financial stress as an additional economic stressor predicting injuries and accident reporting behavior. While affective job insecurity has already been shown to shape levels of injuries and accident under-reporting [31], our research indicates that consistently across two different cultures and normative national systems, employees income-related worries (i.e., financial stress) overshadow their affective reaction to employment-related concerns (i.e., affective job insecurity) in determining the injuries they experience and the number of accidents they decide to report. As such, employee concerns about their income may take precedence over their worries regarding job instability in prompting higher injuries and accident under-reporting, whether Americans or Italians, and whether permanent or contingent. These findings are consistent with American and European reports on the priority of concerns in people's life [2, 3], wherein financial inadequacy issues stand in top positions, and thus contribute to a better understand-

ing of the dynamic interplay of different economic stressors in affecting employee safety outcomes. This would lend support to Warr's [72] Vitamin Model, suggesting that availability of money is among the nine posited environmental "vitamins" (i.e., needs) that people require in order to maintain their psychological health, and, by extension, to prevent from getting injured.

Our study also extends previous theorizing about emotional contagion by incorporating economic stress and safety. While literature has established the role of emotional contagion in shaping work-related stress (e.g., job burnout; [22]), this is the first study to consider how social exchanges of positive/negative emotions (i.e., contagion) at work may be related to employees levels of economic-related stress as well as accidents reporting behaviors and the likelihood of experiencing injuries. In particular, our findings contribute to expanding the Job Demands-Resources model. While previous research [50] demonstrated that contagion of positive (i.e., joy) and negative emotions (i.e., anger) may serve respectively as a job resource and a job demand in predicting job burnout, our findings further expand this framework and qualifies contagion as a job resource/demand in developing/preventing stress related to economic adversities. Noteworthy, the viral spreading of anger (i.e., anger contagion) at work increased employees' affective reactions to economic adversities as well as their injuries rates and the tendency to under-report accidents.

## 5.2. *Practical implications*

From a practical perspective, the results of this study have important implications. Not only are the economic costs of workplace injuries high (e.g., lost wages and productivity, medical costs, and administrative expenses), but also not reporting an accident has negative consequences in that untreated injuries can worsen and cause even greater health and productivity problems over time [12, 73]. Paradoxically, an additional negative consequence of under-reporting is that employees take on the financial responsibility of any medical claims that may result since they cannot access worker's compensation if they do not report the accident, thus potentially further eroding their financial situation.

Our findings also reveal that financial stress is a key mediator between emotional contagion and poor safety outcome. According to appraisal theory of emotion and stress [74], an environment

that a person appraises as relevant and threatening constitutes a source of stress. Furthermore, as suggested by Probst [75], involvement practices and participative decision-making that allow employees to develop sense-making and regain control also help in experiencing fewer negative emotions regarding unstable situations. Given that individuals who believe to be able to protect themselves from negative events at work may be less vulnerable to the effects of economic stressors [9], intervention programs might fruitfully provide management and employees with tools to help them augment the experience of absorption of joy, and conversely inhibit the experience of absorbing other's anger. Effective emotion management requires knowledge about the nature of emotions Andrieş [76], thus enabling to improve employees' ability to manage their emotional resources so as to adapt to job requirements and work to increase organizational effectiveness and safety. Specifically, employees self-awareness of emotional processes is the first step to recognize how one's own social interactions with people at work contribute to feelings of joy and anger, as well as the mechanisms through which these emotions may cause one to experience high/low economic stress as well as injuries. Consistent with Gross's [77] model of emotional regulation, this may help incumbents to develop copying skills by examining the conditions under which they reappraise their cognitions and subsequently regulate their emotions.

## 5.3. *Study strengths, limitations, and future directions*

While the current findings are promising and suggest that employees' subjective concerns on their financial situation overlook employment related worries in predicting an increase in poor safety outcomes, they also warrant further investigation. Our study is an important first step at demonstrating the relationship between income-related economic stress and safety outcomes; yet, this framework can be further expanded. While we focused on employee affective reaction to their employment- and income-related situation, future research could consider the concurrent role of cognitive facets of employment- (i.e., job insecurity) and income-related (i.e., financial inadequacy) economic stressors in predicting workplace injuries and accident under-reporting. Further, consistent with the global worries about the financial crisis [3, 5], future studies should investigate the potentially detrimental effects of emotional

contagion of fear in boosting employees economic stress and subsequent workplace injuries as well as under-reporting behaviors. An additional venue for advancing the literature on the link between economic stress and job safety points at incorporating the study of how contextual effects of organizational processes in one's occupation, such as safety culture, safety climate, and job insecurity climate [31], influence and shape the individual experience of economic stress. Toward that end, future studies considering possible organizational differences and taking a multilevel modelling approach should target employees nested within a large number and wide variety of organizations. An additional notable strength of the current study is the two-country data, which increases the likelihood of generalizability of the research findings and applications. However, while the set of data in the US and Italian context was drawn from numerous organizational samples representing a wide variety of industry sectors, they were nonetheless convenience samples. Hence, our findings might arguably be affected by self-selection biases.

Finally, the current study relies on cross-sectional and self-report data. Although previous research indicates that self-reports of safety-related behavior are appropriate and "may be the best choice when time and monetary resources restrict measurement to one indicator" [62, p. 51], longitudinal studies could provide added support for the causal links posited in our model. Longitudinal research could also better delineate the cross-lagged associations between perceived income-related (i.e., financial stress) and employment-related (i.e., affective job insecurity) stressors, and safety outcomes in the wake of economic instability and employment uncertainty.

## Conflict of interest

None to report.

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