



# POSITION PAPER

## Advancements in crossover theory

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### Abstract

**Purpose** – The central aim of this paper is to give an overview of theory and research on the crossover of (work-related) wellbeing from employees to their partners at home. In addition, it seeks to discuss studies on the crossover of wellbeing from employees to their colleagues in the workplace. It aims to discuss possible moderators of the crossover effect and delineate a research agenda.

**Design/methodology/approach** – The paper takes the form of a literature review.

**Findings** – The review of the literature shows that strain may spillover from work to home, and consequently influence, the wellbeing of one's partner. Additionally, the paper discusses recent studies documenting that the enthusiasm for one's work may cross over to the partner as well. Furthermore, research has shown that employees influence one another in the workplace. Several conditions may facilitate such crossover, including the frequency of interactions, empathy, susceptibility to contagion, and similarity. The paper outlines a research agenda, and indicates what the gaps in the literature are.

**Originality/value** – The literature review reveals which advancements can be made in crossover theory. One way would be to further validate the spillover-crossover model. This model postulates that job demands lead to work-family conflict, which, in turn, leads to conflict with the partner (social undermining). Thus, job strain (or work engagement) first spills over from work to home, and then crosses over to the partner. This interaction sequence consequently influences the partner's wellbeing.

**Keywords** Job satisfaction, Family life, Stress

**Paper type** General review

Many studies have shown that job demands (e.g., a high workload and emotionally demanding customers) have a negative impact on employee wellbeing (e.g., Quick and Tetrick, 2003), whereas job resources (e.g., social support, performance feedback, task identity) have a positive impact, particularly on employee engagement (e.g., Bakker and Demerouti, 2008). However, less attention has been paid to possible consequences of the work environment for those with whom employees frequently interact – their intimate partners. The central aim of this position paper is to give an overview of theory and research on crossover. We will discuss studies on the crossover of strain and engagement from employees to their partners at home, and studies on the crossover of work-related wellbeing from employees to their colleagues in the workplace. In addition, possible moderators of the crossover effect are discussed, and a



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research agenda is lined out. We will start with an introduction of the spillover and crossover constructs and a brief discussion of the differences between them.

### **First spillover, then crossover**

Researchers have identified two different ways in which demands or strain are carried over (Bolger *et al.*, 1989; Westman, 2001; Wethington, 2000). Spillover (sometimes labeled work-family conflict) is a within-person across-domains transmission of strain from one area of life to another. Previous research has primarily focused on how reactions experienced in the work domain are transferred to and interfere with the nonwork domain for the same individual (Eby *et al.*, 2005). For example, an employee may experience a time-based conflict between work and private life when work overload results in overwork and “eats up” leisure time. Similarly, a worker may experience a strain-based conflict (Greenhaus and Beutell, 1985) when confronted with something unfair and upsetting that happened during the day at work, about which he/she cannot stop thinking during the evening at home. Indeed, many studies have now found evidence for such negative, but also for positive spillover effects. Moreover, several studies have shown that spillover also occurs from family to work (for a meta-analysis, see Ford *et al.* (2007)).

In contrast, crossover involves transmission across individuals, whereby demands and their consequent strain cross over between closely related persons (Westman, 2001). Thus, in crossover, stress experienced in the workplace by an individual may lead to stress being experienced by the individual’s partner at home. Whereas spillover is an intra-individual transmission of stressors or strain, crossover is a dyadic, inter-individual transmission of stressors or strain. Crossover research is based upon the propositions of role conflict theory, recognizing the fluid boundaries between work and family life. However, the crossover model adds another level of analysis to previous approaches by adding the inter-individual level, specifically the dyad, as an additional focus of study (Westman, 2001).

Bakker *et al.* (2008, 2009) have argued that job stress or engagement first spills over from work to home, and then crosses over to the partner. Their spillover-crossover model postulates that job demands lead to work-family conflict, which, in turn, leads to negative interactions with the partner (social undermining). This negative interaction sequence consequently increases one’s partner’s home demands, and impairs partner’s wellbeing (increased exhaustion, reduced marital satisfaction).

### **Crossover from work to home**

Crossover is the term used to describe the interpersonal process that occurs when job stress or psychological strain (stress reactions) experienced by one person affects the level of strain of another person in the same social environment (Bolger *et al.*, 1989). Some researchers have focused on the crossover of job stressors from the individual to the spouse, others have examined the process whereby job stressors of the individual affect the strain of the spouse, and yet others have studied how psychological strain of one partner affects the strain of the other (see Westman, 2001).

Most studies have investigated and found the crossover of psychological strains such as anxiety (Westman *et al.*, 2004), burnout (e.g., Bakker and Schaufeli, 2000; Westman and Etzion, 1995), distress (Barnett *et al.*, 1995), depression (Howe *et al.*, 2004), adjustment (Takeuchi *et al.*, 2002), work-family conflict (e.g., Hammer *et al.*, 1997;

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Westman and Etzion, 2005), and marital dissatisfaction (Westman *et al.*, 2004). A few studies investigated crossover of health complaints and perceived health between partners (Gorgievski-Duijvesteijn *et al.*, 2000; Westman *et al.*, 2008). Some studies focused on unidirectional crossover from husbands to wives, whereas others looked for bi-directional crossover, from husbands to wives and from wives to husbands but detected only uni-directional crossover (Westman and Bakker, 2008).

Westman (2001) suggested broadening the definition of crossover into contagion of positive as well as negative events. Positive experiences and feelings are not merely the absence of stress; they are qualitatively different experiences (Fredrickson, 2001). According to Westman, just as stressful job demands have a negative impact on the wellbeing of the partner, positive feelings following positive job events may also cross over to the partner or colleague and have a positive effect on their wellbeing. Bakker and Demerouti (2009) argue that if the crossover process operates via empathy, one would expect to find not only crossover of negative experiences, but positive experiences as well. The core relational theme for empathy involves the sharing of another person's emotional state, distressed or otherwise. Thus, as strain in one partner may produce an empathetic reaction in the other, which increases the recipient's strain, the work engagement expressed by one partner may fuel the other partner's engagement. This process happens because an individual's thoughts are focused on the positive aspects of work that make him/her enthusiastic. One can think of many positive instances, such as enjoyable experiences at one's job (reaching one's sales targets, making promotion) leading to the crossover of job satisfaction and engagement, eliciting a good mood in the partner at home.

We found only a few studies that detected crossover of positive experiences (Bakker *et al.*, 2005; Demerouti *et al.*, 2005; Prince *et al.*, 2007). For example, Bakker *et al.* (2005) tested the hypothesis that burnout and work engagement may cross over from husbands to wives and vice versa among couples working in a variety of occupations. Their findings provided evidence for the crossover of burnout (exhaustion and cynicism) and work engagement (vigor and dedication) among partners. The bi-directional crossover relationships were significant and about equally strong for both partners, after controlling for important characteristics of the work and home environment.

In a similar vein, Bakker and Demerouti (2009) investigated the crossover of engagement from working wives to their husbands. The results of moderated structural equation modeling (SEM) analyses showed that work engagement crossed over from wives to husbands. Furthermore, they found that empathy (particularly perspective taking) moderated the crossover effect. Men who were perspective takers were more strongly influenced by their partners' work engagement than their counterparts who were not perspective takers. Finally, in an international context, Westman *et al.* (2009) studied 275 business travelers and their working spouses and found crossover of vigor from business travelers to their working spouses.

### **Crossover in the workplace**

The study of crossover thus far has been limited mostly to the crossover of stress and strain between spouses. Westman (2001) has suggested adding crossover at the workplace to crossover research. As previous crossover research was based on the work-family interface, researchers have focused particularly on the family as the

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“victim” of the job incumbent’s stress (e.g., Jackson and Maslach, 1982). However, if we base the crossover construct on role theory, we can broaden the scope of research and investigate the crossover of stress among role senders in the work environment. Moreover, in the latter case, we can broaden the conceptualization of the unit of study from dyads to the work team.

This approach is consistent with Moos’ (1984) theory that people are part of social systems and we need to understand them within these systems. Each member in the system is linked to other members and, presumably, change in one will affect change in others. Thus, a person’s stress generated at the workplace may transmit to others in the work team. Individuals in the work team who share the same environment may start a crossover chain of stressors and strain among themselves whether the source of stress is in the family or at the workplace (Van Emmerik and Peeters, 2009). The shared environment that is crucial to the crossover process characterizes workplaces where job incumbents work in close cooperation. Clearly, the study of crossover should be extended to the workplace.

Westman and Etzion (1999) conducted one of the first crossover field studies in the workplace. They found evidence for crossover of job-induced strain from school principals to teachers and vice versa. In this example of workplace crossover, the findings relate to crossover between a manager and subordinates and not among the teachers. The next step is to investigate affective linkages among team members. This has been done in emotional contagion research.

Emotional contagion has been defined as:

The tendency to automatically mimic and synchronize facial expressions, vocalizations, postures, and movements with those of another person and, consequently, to converge emotionally (Hatfield *et al.*, 1994, p. 5).

The emphasis in this definition is on non-conscious emotional contagion. Research has indeed shown that, in conversations, people “automatically” mimic the facial expressions, voices, postures, and behaviors of others (Bavelas *et al.*, 1987; Bernieri *et al.*, 1988), and that people’s conscious experience may be shaped by such facial feedback (e.g., Laird, 1984).

There is, however, another way in which people may “catch” another’s emotions. Contagion may also occur via a conscious cognitive process by “tuning in” to the emotions of others. This will be the case when a person tries to imagine how they would feel in the position of another, and, as a consequence, experiences the same feelings. Thus, the realization that another person is happy or sad may trigger memories of the times we have felt that way, and these reveries may spark similar emotions (Hsee *et al.*, 1990). Particularly the attitude of helping professionals to show empathic concern is likely to foster such a process of consciously “tuning in” to others’ emotions.

Regardless of why such contagion might occur, researchers from a wide range of disciplines have described phenomena that suggest that emotional contagion does exist (see Hatfield *et al.*, 1994; and McIntosh *et al.*, 1994, for overviews). Recently, researchers have begun to investigate affective linkages between team members (e.g., Barsade, 2002; Totterdell *et al.*, 1998). Barsade (2002) in her experimental work demonstrated that emotional contagion does occur in groups and changes people’s moods and serves as affective information: people are “walking mood inductors”

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continuously influencing the moods of others. Other researchers focused on emotional contagion at the workplace viewing contagion as a reciprocal emotional reaction among employees who closely collaborate. Thus, in a field setting, Totterdell *et al.* (1998) found evidence that the moods of teams of nurses and accountants were related to each other even after controlling for shared work problems.

Bakker *et al.* (2006) investigated the crossover of burnout and work engagement among Dutch constabulary officers. On the basis of theories on crossover and emotional contagion, they hypothesized that both types of work-related feelings and attitudes may transfer from teams to individual team members. The results of multilevel analyses confirmed this crossover phenomenon by showing that team level burnout and work engagement were related to individual team members' burnout (i.e. exhaustion, cynicism and reduced professional efficacy) and engagement (vigor, dedication, and absorption), after controlling for individual members' job demands and resources. Similarly, using a longitudinal design, Westman *et al.* (2008) looked at crossover of job stress and exhaustion among 100 teams of employees of an employment agency in The Netherlands, twice during six weeks. Multi-level analysis using this longitudinal design did not reveal a main effect of crossover. However, the results showed a moderating effect of team cohesion and social support. Although teams characterized by low levels of cohesion and social support showed no crossover of job stress and exhaustion, Westman *et al.* (2008) did detect crossover of job stress and exhaustion from the group to individual team members in teams characterized by high levels of cohesion and social support.

The first empirical indication for the crossover of burnout came from Rountree (1984), who investigated 186 task groups in 23 local settings of organizations. He found that 87.5 percent of employees with the highest scores on burnout worked in task groups in which at least 50 percent of the staff was in a similar advanced burnout phase. Low scoring, less burned-out employees showed a similar, but less marked, tendency to cluster. Rountree (1984, p. 245) concluded that "[...] the affinity of work groups for extreme scores seems substantial". Thus, individuals with very high or very low burnout scores can often be found within one task group, suggesting the possibility that task group members "infect" each other with the burnout "virus". After reviewing similar additional studies, Golembiewski *et al.* (1986, p. 184) concluded that: "Very high and very low scores on burnout tend to concentrate to a substantial degree." They added that "these findings suggest 'contagion' or 'resonance' effects" (Golembiewski *et al.*, 1986, p. 185).

However, this concentration of burnout in particular work groups may also be explained by a negative change in the working conditions, because burnout has been related to a wide range of stressors and detrimental behaviors. For example, Freudenberger (1974) observed that burned-out individuals do not perform efficiently, independently of how hard they try. Indeed, it has been found that they make more on-the-job mistakes, misuse work breaks, and have higher absenteeism rates (e.g., Kahill, 1988). In a team, each of these behaviors may increase the workload of the other team members, as they will have to compensate for the inefficient or disruptive behaviors of their burned-out colleagues.

To rule out the third variable explanation, Bakker and his colleagues set up a series of studies including measures of working conditions, burnout and/or work engagement. Evidence for direct and indirect routes of socially induced burnout was

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found in a study that included nurses from 80 European intensive care units (Bakker *et al.*, 1997; see also Bakker *et al.*, 2005). In addition to a direct effect from unit burnout to individual nurses' burnout, unit burnout had an indirect effect through its influence on individual nurses' workload and job autonomy. More specifically, unit burnout had a positive influence on the workload reported by individual nurses, and a negative impact on their autonomy. These changed working conditions, in turn, had a significant impact on their experience of burnout. That is, workload had a positive, and job autonomy had a negative influence on individual nurses' feelings of exhaustion, depersonalization (a specific form of cynicism), and reduced personal accomplishment (i.e. professional efficacy). This indirect influence of unit burnout on individual burnout can be explained by assuming that individual nurses had more work to do because of the impaired job performance of their burned-out colleagues. Conceptually similar findings have been reported by Bakker *et al.* (2003) among a sample of employees of a large banking and insurance company. They showed that burnout at the team level is related to individual team members' burnout scores, both directly and indirectly – through its relationship with individual members' job demands, job control and perceived social support.

### **A closer look at the crossover process**

Hatfield *et al.* (1994) have argued that there are several circumstances under which people should be especially likely to catch others' emotions. Emotional contagion or crossover is particularly likely, for example, if individuals pay close attention to others, and if they construe themselves as interrelated to others rather than as independent and unique. Given the increased models of teamwork in modern organizations, it is likely that employees indeed experience higher levels of interdependence, and therefore they are more sensitive to the emotional states of their colleagues. Furthermore, a number of studies have shown that there exist stable individual differences in people's susceptibility to emotional stimuli (Doherty *et al.*, 1995; Stiff *et al.*, 1988), and that these individual differences are good predictors of the extent to which people catch positive and negative emotions from others. What are the conditions under which emotional contagion and crossover are most likely?

#### *Empathy*

Westman and Vinokur (1998) have argued that empathy can be a moderator of the crossover process. Literally, the root meaning of the word empathy is "feeling into". Starcevic and Piontek (1997) define empathy as interpersonal communication that is predominantly emotional in nature. It involves the ability to be affected by the other's affective state, as well as to be able to read in oneself what that affect has been. Similarly, Lazarus (1991, p. 287) defined empathy as "sharing another's feelings by placing oneself psychologically in that person's circumstances". The core relational theme for empathy would have to involve a sharing of another person's emotional state, distressed or otherwise. Accordingly, an individual's strain produces an empathic reaction in the partner that increases the partner's strain, by way of what may be called empathic identification. Social learning theorists (e.g., Bandura, 1969; Stotland, 1969) support this view, and have explained the transmission of emotions as a conscious processing of information. They suggested that individuals imagine how they would feel in the position of another – empathic identification – and thus come to

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experience and share the other's feelings. Eckenrode and Gore (1981, p. 771) suggested that the effect of one's strain on the spouse's distress might be the result of empathy as expressed in reports such as "We feel their pain is our own".

#### *Susceptibility*

Bakker *et al.* (2001) observed that general practitioners' individual susceptibility to emotional contagion was positively related to burnout. That is, they were most vulnerable to catching the negative emotions expressed by their patients, such as fear, anxiety, depressed mood, and worry. Interestingly, and in line with Hatfield *et al.*'s (1994) predictions, susceptibility to the emotions of others particularly showed a relationship with burnout among doctors who had many burned-out colleagues. That is, practitioners who perceived burnout complaints among their colleagues and who were susceptible to the emotions expressed by their colleagues reported the highest emotional exhaustion scores. A similar finding was reported by Bakker and Schaufeli (2000), who found that teachers that were most vulnerable to the emotions and negative attitudes expressed by their colleagues were most likely to become burned-out.

#### *Frequency of exchanging views*

In their study among teachers, Bakker and Schaufeli (2000) also found that teachers who frequently talked with their burned-out colleagues about problematic students had the highest probability of catching the negative attitudes expressed by their colleagues. In repeatedly trying to understand the problems their colleagues were facing, teachers presumably had to tune in to the negative attitudes expressed by their colleagues (about themselves as well as about students). This creates a condition under which central or systematic processing of information is likely to occur (Petty and Cacioppo, 1986). The result is negative attitude change, particularly when the burned out colleague (the "source") has evidence or strong arguments to bolster their frustration and uncaring attitudes.

#### *Similarity with the source*

Classic social comparison theory regards uncertainty as the main motive for social comparison activity (Festinger, 1954). Festinger argued that when objective sources of information for self-evaluation are lacking, people would turn to others in their environment. Schachter (1959) stated that when individuals feel uncertain about the appropriateness of their emotions, they tend to reduce this uncertainty by socially comparing and by adjusting their emotional reactions to those of others. Indeed, Groenestijn *et al.* (1992) found that nurses who perceived burnout complaints among their colleagues and who felt a strong need for social comparison were more susceptible to burnout compared to those who had a low need for social comparison.

In addition, an important assumption in Festinger's (1954) theory is that others who are similar will be preferred for comparison, because information about similar others is most informative for self-evaluation (see also Tesser, 1988). Keinan *et al.* (2003) investigated the attitudes and reactions to media coverage of terrorist acts. They suggested that the experience of stress responses in reaction to media coverage stems from identification with the victims of violence, and this identification is related to the

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degree of similarity between the media consumer and the victim: the greater the number of shared characteristics, the greater the probability of identifying with the victim.

Bakker *et al.* (2007) tested this hypothesis in the context of burnout crossover among a sample of soldiers. The participants were randomly exposed to a videotape of a burned-out or an engaged colleague who was either similar in profession and status (soldier), or who had a considerably higher status (squadron leader). The results confirmed the crossover of burnout from the stimulus soldier to the group. In addition, a significant interaction effect for cynicism revealed that the crossover of burnout was moderated by similarity with the stimulus person. Soldiers were particularly susceptible to the negative attitudes endorsed by those who were similar in rank.

Potential moderators can not only be found at the individual or dyadic level. At the group or team level, contextual variables can be thought to moderate crossover effects as well. So-called cross-level studies predict that higher level organizational properties (e.g., cohesion at the group level) may influence lower level organizational properties (e.g., crossover among team members).

### *Climate*

A positive climate within teams/groups may buffer the effects of crossover by providing group members with emotional support during stressful periods (Cohen and Wills, 1985) or by providing group members with the means necessary to actually reduce stressors (Beehr *et al.*, 1995). For instance, in the study of Bakker *et al.* (2006) it was suggested that engaged workers communicated their optimism, positive attitudes, and pro-active behaviors to their colleagues, and created a positive team climate. Such a positive team climate in turn may buffer the crossover effects of stressors.

Cohesiveness describes group members' affinity for the other group members and the desire to remain part of the group. In cohesive work teams, members tend to be more sensitive to others and are more willing to aid and assist them. Moreover, cohesiveness has been shown to lead to better communication within the group, stronger group influence, and more favorable interpersonal evaluations within groups (Kidwell *et al.*, 1997). The latter authors suggested that with regard to social exchange, it can be expected that cohesive groups display more positive and frequent social exchanges than noncohesive groups. This may, in turn, increase the likelihood of crossover. Thus, if most of the team members experience engagement, the crossover of engagement will be stronger in such teams compared to teams with low levels of engagement. On the other hand, if the team is burned-out, the likelihood of crossover of burnout among team members is increased. Indeed, in a longitudinal study, Westman *et al.* (2008) detected a moderating effect of team cohesion on the crossover of job stress and exhaustion from the group to individual team members. They demonstrated crossover of job stress and exhaustion from the group to individual team members only in teams characterized by high levels of cohesion.

The review above of variables at the aggregate level is intended to be illustrative rather than exhaustive – to demonstrate how various group or team level variables can be thought to moderate crossover effects as well. Many aggregate level constructs remain to be adequately explored through empirical research.

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### Future research directions

Our review shows that crossover theories have clearly made progress during the past decade. Nevertheless, there are still several advancements that can be made. One innovation in crossover research could be to move beyond self-report measures conventionally used. Such self-reports have been the only method of assessing the extent to which emotions cross over between partners. However, emotional experiences are well documented to affect cognitive processes, so that negative affect leads to poor task performance (e.g., Mandler, 1993), whereas positive affect holds beneficial effects for cognitive processes (e.g., Isen, 1999). Such effects of negative vs. positive emotions have been substantiated with many cognitive processes including attention, creative thinking, and memory (for a review see Isen, 1999). Future research should include objective measures of cognitive tasks alongside traditional self-report measures, under the rationale that negative crossover can be indicated by decreased cognitive performance and positive crossover can be indicated by enhanced cognitive performance. If we think of a laboratory experiment, we may have negative and positive stimulus persons talking to a team of nurses. We assume that the team that is confronted with the negative stimulus will show negative crossover and the other team will exhibit positive crossover. In addition to collecting data on burnout/work engagement and negative affectivity, researchers could provide the nurses with cognitive tasks – for example, a creativity task adapted from the *Torrance Tests of Creative Thinking* (Torrance and Ball, 1984) where participants are asked to list as many uses as they can think of for an ordinary object. Another way to utilize objective measures is the use of physiological measures such as blood pressure and heart rate. If the sample consists of physicians or nurses other tests can be conducted in the hospital (urine, saliva, etc.).

So far, the crossover of employee wellbeing has been studied mostly in field studies using between-subjects designs. An innovation would be to study crossover among employees using a within-subjects design in which participants are followed closely during their working day, for instance by asking them to keep an electronic diary (Van Eerde *et al.*, 2005). An important reason to choose for a diary design – compared to experimental designs – is that diary designs allow for causes and consequences to occur in a natural, spontaneous manner (Bolger *et al.*, 2003). For example, one could collect information among employees who closely collaborate on days on which they are highly engaged and on days of relatively low engagement. Consequently, one could investigate the crossover of daily engagement and its effect on daily job performance. In addition, diary designs, compared to cross-sectional designs, allow for examining temporal sequencing of events. Thus, participants could report on their levels of engagement and performance at two different points in time. Also, since there is relatively little time between the actual experience (e.g., work engagement) and the reporting on this experience, the retrospective bias is reduced and the validity and reliability are increased.

Studies on crossover processes within work teams and for instance between supervisors and team members require multilevel analytic techniques. Measurement issues regarding what happens when lower-level variables are aggregated to represent higher level constructs are still a central theme in multilevel research on crossover (see Bliese *et al.*, 2007). For instance, in the Westman and Etzion (1999) study, the aggregation of answers from different subordinates whose interactions with the

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principal might be different, is problematic. The principal may provide social support to one and undermine the other. As the authors argue, looking at the average leads to ignoring information. One possible solution is to concentrate on dyads; the principal and the chief teacher, or the bank manager and deputy manager. In this way, specific interaction patterns can be detected and possibly stronger crossover processes. However, the downside of choosing for a dyadic design is the apparent neglect of multilevel effects.

An important research direction is to further test and expand the recently introduced spillover-crossover model (Bakker *et al.*, 2008, 2009). Accordingly, job stress or work engagement first spills over from work to home, and then crosses over to the partner. The spillover-crossover model postulates that job demands lead to work-family conflict, which, in turn, leads to conflict with the partner (social undermining). This negative interaction sequence consequently impairs partner's wellbeing. This is an indirect crossover process. It would be interesting to test the spillover-crossover model using positive indicators. One hypothesis is that job resources facilitate engagement, which, in turn, leads to social support and work-family facilitation. This may have a positive impact on others in the family, including one's partner and one's children.

Final suggestions for future research include the use of longitudinal and experimental studies in order to detect and better understand the crossover process. Such studies will help us understand the process that begins with spillover, develops into crossover and maybe the fade out of the crossover process.

### General conclusions

Our review of the literature shows that strain may spill over from work to home, and consequently influence the wellbeing of one's partner. In addition, we discussed recent studies that documented that the enthusiasm for one's work may cross over to the partner as well. Furthermore, research has shown that employees influence each other in the workplace. Several conditions can facilitate such crossover, including frequency and quality of interactions, empathy, susceptibility, and similarity. We have outlined a research agenda, and indicated what the gaps in the literature are. Our hope is that this review stimulates future crossover research and facilitates further advancements in crossover theory.

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