

Abstract

Previous studies found that burnout is, to some extent, contagious, and argued it is a socially induced phenomenon. However, up till now, actual social interactions, and the long-term effect of this contagion remained out of sight. This study aims to expand earlier findings on burnout contagion by applying a social network approach. This approach assumes that some relationships provide more information on the feelings and attitudes of the other. This study therefore does not only identify interaction partners, it also examines how characteristics of the relationship (multiplexity, frequency, and embeddedness) with those interaction partner related to burnout contagion. By means of (temporal) network autocorrelation models, burnout contagion was empirically investigated in the context of secondary school teams. Cross-sectional analyses were performed on data of 931 teachers, working in 14 schools. Long-term effects of burnout contagion were assessed in 12 schools with 578 teachers. The results showed that interpersonal interactions act as conduits for burnout contagion, especially when relations are strong in terms of frequency, embeddedness and multiplexity. This study also identified that features of relationships play a differential role in the contagion of the different components of burnout. Moreover, long term effects were found for emotional exhaustion. This study provided evidence for the importance of interpersonal relationships in the contagion of burnout.

Practitioners points:

- Negative feelings are transmitted through personal interaction, as such the importance of positive (social) experiences within the school team are stressed.
- Co-rumination should be avoided as it may impact negatively on employees' well-being in the short and long run.

- Given the contagion of burnout, interventions for preventing and reducing burnout should not solely be focused on increasing social support within the school team. External support might be necessary to brake a potential negative cycle within the school team.

Keywords: burnout, emotional contagion, social network approach, secondary schools, teachers

Introduction

Recent decades, there has been a growing attention for the phenomenon of burnout. Burnout has been defined as a syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment (Maslach & Jackson, 1981). Maslach, Jackson, and Leiter (1997) described emotional exhaustion as a feeling of tiredness and being emotionally overextended by one's work. Depersonalization includes the unfeeling and impersonal response toward the workplace, and actors that are part of this workplace. Reduced feelings of personal accomplishment are observed when the feeling of competence diminishes, and they no longer feel as they are accomplishing work-related goals. By definition, a syndrome refers to a set of interrelated symptoms (i.e. exhaustion, depersonalization, reduced personal accomplishment) that refer to a single, common entity or psychological state (i.e., burnout).

A wide array of research has addressed the prevalence of the syndrome in order to understand the complex processes that contribute or inhibit feelings of burnout. Burnout is often defined as a socially induced syndrome, and interpersonal relations with other actors have been subject of many of these studies. Several scholars have argued that burnout is, to some extent, contagious. While longitudinal research on this topic is still limited, evidence for this hypothesis is gradually increasing (Bakker, Le Blanc, & Schaufeli, 2005). For instance, Buunk and Schaufeli (1993, p. 53-54) argued that *'burnout develops primarily in a social context, and that to understand the development and persistence of burnout, attention has to be paid to the way individuals perceive, interpret, and construct the behaviours of others at work'*. Bakker and Schaufeli (2000) 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 a study of Bakker, Schaufeli, Sixma, and Bosveld (2001), burnout contagion was confirmed among general practitioners. Also, Bakker, Demerouti, and Schaufeli (2003) found evidence for burnout contagion, but in the context 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. Although a potential explanation could be the higher workloads in particular groups, Bakker et al. (2005) found that even after controlling for job autonomy, subjective workload, and objective workload, levels of experienced and perceived burnout differed significantly across intensive care units.

The burnout contagion hypothesis is based on the idea that individuals are exposed to colleagues expressing their positive or negative emotions, and a corresponding change in the emotional state of the individual is observed (Pugh, 2001). More specifically, emotional exhaustion is the affective component of burnout, whereas depersonalization and reduced personal accomplishment are considered the attitudinal component of the burnout syndrome (Schaufeli & Van Dierendonck, 1993). Because in addition to a behavioural component, attitudes also include an affective component, emotional contagion is likely to play a role in depersonalization as well as reduced personal accomplishment. This is illustrated by the fact that in virtually all previous studies all three burnout symptoms are included and no difference is made between them as far as emotional contagion is concerned (Bakker & Schaufeli, 2000, 2005; Bakker et al., 2005; Bakker, van Emmerik, & Euwema, 2006). The more exposed an individual is to others' emotions, the higher the chance that feelings and emotions will be exchanged and adopted (Hatfield, Cacioppo, & Rapson, 1994). The assumption is that this exposure takes to a large extent place in the daily interactions of employees. More specifically, interpersonal interactions create the possibility to display, both consciously as unconsciously, feelings and attitudes (Leenders, 2002; Pugh, 2001).

However, despite the fact that interpersonal interactions are proposed as the mechanism through which convergence of emotions occurs, up till now, the *actual* interpersonal interactions among employees remained out of sight in research on burnout contagion. With the exception of the study by Kalish, Luria, Toker, and Westman (2015), previous studies have measured exposure to colleagues' levels of burnout by means of self-report scales that addressed the perceived level of colleagues' burnout, or aggregated

individual burnout scores on the team level. This study aims to fill this gap in the literature and open the black box of the process of burnout contagion. It aims at empirically demonstrating that social interactions are conduits for negative feelings and as such drive burnout contagion. Moreover, the nature and strength of these interpersonal interactions and their impact on burnout contagion will be examined, in order to unravel the circumstances that are shaping this process. As such, new insights into the mechanism behind burnout contagion will be generated. In order to reach this aim, we need to go beyond the common research approaches in the field of burnout contagion and gauge actual interpersonal interactions by applying a social network approach. One of the basic assumptions of this approach is that individuals cannot be treated as separate entities and that individual feelings and attributes are not merely the result of individual perceptions or organisational characteristics (Kilduff & Krackhardt, 2008; Wasserman & Faust, 1994). Rather, individuals are interdependent of other actors with whom one interacts (Salancik & Pfeffer, 1978). As a consequence, a social network approach does not only focus on individuals, but also on the relationships that connect them (Wasserman & Galaskiewicz, 1994). This approach makes it possible to identify interaction partners and assess the similarity of feelings of burnout as well as to analyse the role characteristics of interpersonal interactions play in the process of burnout contagion. Moreover, the majority of the studies on burnout contagion have adopted a cross-sectional approach as such insights into long-term burnout contagion are lacking. The current study will address this gap in the literature by examining the role of social interactions for burnout contagion two years later.

In order to investigate the role of social interactions in burnout contagion and the long-term effect they might have, this study focuses on burnout contagion among teachers working in secondary schools. The teaching profession has gained a lot of attention in burnout research (Skaalvik & Skaalvik, 2009), especially because teacher burnout has been associated with several detrimental outcomes for both teachers and students. For instance, previous studies indicated that burnout can be related to lower feelings of job satisfaction,

wellbeing, self-efficacy and higher attrition behaviour (e.g., Maslach, Schaufeli, & Leiter, 2001). Moreover, studies have shown that teacher burnout leads to poorer instructional quality (Klusmann, Kunter, Trautwein, Lüdtke, & Baumert, 2008), lower social and academic adjustment of students (Hoglund, Klinge, & Hosan, 2015), and lower student achievement (Jennings & Greenberg, 2009). In other words, providing more insight in burnout among teachers, is important for the functioning of students, teachers, and schools.

Conceptual framework

Burnout Contagion

Burnout contagion is regarded as a form of emotional contagion. Emotional contagion has been defined as *“the tendency to automatically mimic and synchronise facial expressions, vocalisations, postures, and movements of another person and, consequently, converge emotionally”* (Hatfield et al., 1994, p. 5). It is important to realise that negative emotions appear to be more contagious than positive emotions (McIntosh, Druckman & Zajonc, 1994), suggesting that burnout symptoms would be likely candidates for emotional contagion. In a classic study on contagious depression, Howes, Hokanson and Lowenstein (1985) randomly assigned freshmen to a room with a mildly depressed roommate or with a non-depressed roommate. At the end of the semester, three months later the former became increasingly more depressed over time, whereas depression levels did not change for the latter. Bakker and Schaufeli (2000) stated that burnout contagion is characterised by both unconscious and conscious processes. Scherer and Cho (2003) similarly state that emotional contagion does not require intent or even awareness of influence. Wang, Li and Du (2010) discuss several processes through which emotional contagion can occur. The first process entails mimicry. Individuals may perceive feelings and symptoms of burnout in their colleagues and unconsciously take on these feelings (Bakker & Schaufeli, 2000). For instance, colleagues can act as role models whose symptoms are imitated through a process of emotional contagion (Buunk & Schaufeli, 1993). Next to mimicry, receiving feedback, both verbal (e.g.

vocal) as well as non-verbal (e.g. posture and movement), has been proposed as a process for 'catching' others emotions (Wang et al., 2010).

Contagion may also occur more consciously by 'tuning in' to the emotions of others (Bakker & Schaufeli, 2005). Wang et al. (2010) describe two processes that underlie this 'tuning in': language mediated association and direct induction. This happens when a person tries to imagine how he or she would feel in the position of another, and, as a consequence, experiences the same feelings. Language mediated association entails that this happens due to verbal descriptions of situations and issues, while directed induction starts from the observation of behavior and non-verbal responses. It can be concluded that the first is more conscious in nature than the second. As the professional attitude of teachers is generally characterised by empathic concern, it is likely that a process of consciously tuning in to the emotions of colleagues and students will take place (Bakker & Schaufeli, 2000).

For both conscious and unconscious contagion, the exposure to others' feelings and emotions is vital (Hatfield et al., 1994). Exposure can be regarded as the information an individual receives on the feelings and attitudes of others. Communication theory stated that this exposure mainly takes place through direct social communication (Ibarra & Andrews, 1993, p. 280). Exposure through communication can then lead to more similar perceptions among interaction partners, or what can be described as 'contagion' (Erickson, 1982; Rice & Aydin, 1991). Previous studies have measured this level of exposure by means of self-report scales (e.g., Bakker & Schaufeli, 2000; Bakker et al., 2001). Respondents were asked to indicate how burned out their colleagues feel (e.g., '*According to you, how many of your colleagues are burned-out?*') and to what extent they are exposed to their burnout (e.g., '*how often do you talk to your colleagues?*'). However, within this self-report approach, feelings of burnout are measured in a binary way, differences among colleagues are neglected and it is assumed that respondents interact equally intensive with all colleagues. The focus remained largely on the individual and his/her perceptions of others. The study of Kalish et al. (2015) is an exception and demonstrated the value of taking a truly interpersonal perspective. Results

showed that stress levels affect communication patterns: individuals with higher stress levels were less likely to engage in interaction with new colleagues and mainly maintained existing communication ties. They also tended to communicate primarily with individuals with similar stress levels. Stress-related vicious circles were identified and showed that communication networks increased stress levels over time (Kalish et al., 2015). However, the study of Kalish et al. (2015) was conducted in a very specific setting across a short time span, namely a two-day military assessment boot camp. As such, the authors recommend examining interactions of group members working on real tasks across a longer period of time (Kalish et al., 2015). This study addresses this gap. By taking an interpersonal perspective, insight into the actual role of interpersonal interactions in burnout contagion can be further disentangled.

Some studies have recognised the importance of the characteristics of the direct social environment as well as the role team-level moderators could play. Prior studies for example focused on the similarity of individual burnout and 'team burnout' to grasp burnout contagion. Team burnout was measured by aggregating individual burnout scores of team members to the team level (e.g., Bakker et al., 2006; Bakker et al., 2003). In addition, Westman et al. (2011) demonstrated that high team cohesiveness and social support reinforces the crossover of burnout within the team, indicating that the nature of the interpersonal interactions matters. However, team members do not interact with all colleagues (or even team members) in the same way and to the same degree; they are not (equally) exposed to each other's feelings of burnout. Prior research has ignored the potential impact these differences in interpersonal relations among team members may have in the contagion of burnout. By applying a social network approach, the current study can deepen our insight into which interpersonal interactions drive burnout contagion. The study of Westman et al. (2011) stated that increasing interpersonal interaction and support is a double-edged sword leading to both positive as well as negative outcomes in well-being. Increasing understanding in differences within these interpersonal interactions seems pivotal for understanding when interpersonal interaction is beneficial or detrimental for employee well-being. Therefore, this study wants to fill this gap by

adopting a social network approach to conceptualize, measure and analyse the process of burnout contagion.

A Network Approach on Burnout Contagion

Within a social network approach, interpersonal relationships are seen as the channels through which feelings, attitudes, and perceptions are exposed (Rogers & Kincaid, 1981). Ibarra and Andrews (1993) argued that these feelings, attitudes, become more similar through interpersonal interactions, as such, interpersonal interactions act as conduits for emotional contagion. Empirical evidence for the idea that interaction partners develop shared feelings, attitudes, and perceptions has been identified in several previous network studies (Dean & Brass, 1985; Hartman & Johnson, 1989; Rice & Aydin, 1991; Siciliano, 2016). The main advantage of this social network approach is that it enables the identification of the actual interpersonal interactions a person has (Friedkin & Johnsen, 1999). In contrast with prior research assuming that team or organisational members are exposed to each other's levels of burnout, this approach grasps who actually interacts with whom, in order to assess the similarity among them. Until now, empirical support for the fact that burnout occurs through interpersonal interactions is missing. As such, our first hypothesis states:

H1: Burnout is contagious through interpersonal interactions

In addition, prior studies do not consider the role different kinds of interpersonal interactions might play. Within the work context, the distinction can be made between instrumental interactions and expressive interactions. Based on Ibarra (1993), the first type can be described as the social interactions that are aimed at achieving work related goals, such as the exchange of information or advice (Ibarra, 1995). In the case of teachers, instrumental interactions are those that are aimed at exchanged work-related resources (e.g., information related to the classroom practice). The second type are interactions that are not directly aimed at achieving work related goals (Burt, 1997). These interactions are often focused on the actor's best interest and have an affective, emotional, component (Ibarra, 1993). Examples of

this type of interactions among teachers are providing personal guidance or friendship relations. Immediately, the question rises if burnout contagion takes place in instrumental interactions (as burnout is often defined as a work-related syndrome), in expressive interactions (wherein two teachers interact on more personal matters that go beyond the working context), or a combination of both. Bakker and Schaufeli (2000) stated that burnout contagion occurs through both unconscious and conscious processes. While expressive interactions are likely to foster these conscious processes through the overt discussion of negative feelings, instrumental interactions focusing on work-related goals might play a role in burnout contagion through unconscious processes. In expressive interactions emotional contagion mechanisms such as (verbal) feedback and language mediated association are prominent (Wang et al., 2010). In instrumental interactions, emotions are more likely to be gauged based on non-verbal behaviour, as such processes such as mimicry and directed induction play a prominent role in this type of interactions. Bakker and colleagues (2001, p. 85) state “research has indeed shown that, in conversations, people “automatically” mimic the facial expressions, voices, postures, and behaviours of others and that people’s conscious experience may be shaped by such facial feedback.”

It is expected that conscious exchange of negative feelings will have a larger impact than unconscious processes, as such it is expected that burnout contagion is higher in expressive interactions where (negative) emotions are overtly discussed than in instrumental interactions. Processes such as (verbal) feedback and language mediated induction are assumed to play a stronger role than mimicry and direct induction that depend largely on the interpretation of non-verbal behaviour including postures and movements (Wang et al., 2010).

H2: Burnout contagion is stronger in expressive interactions than instrumental interactions.

Moreover, being exposed to both instrumental and expressive interactions is expected to have the strongest effect because of the combination of conscious and unconscious processes. Individuals both discuss (negative) emotions as well as mimic the behaviour and expressions

of various interaction partners as such mechanisms of mimicry, feedback as well as language mediated and direct induction are expected to occur simultaneously and potentially reinforce each other (Wang et al., 2010).

H3: Burnout contagion is stronger when both expressive and instrumental interactions occur in comparison with only instrumental or expressive interactions.

Defining the Strength of a Relationship: Multiplexity, Frequency and Embeddedness

Friedkin and Johnsen (1990, 1999) developed network models of how interacting individuals influence each other to produce homogeneity of feelings, beliefs, and attitudes. They have argued that the strength of a relationship affects the similarity among interaction partners (Erickson, 1988; Friedkin & Johnsen, 1999). More specifically, it is assumed that in stronger relationships, information on feelings, attitudes, and perceptions is exchanged more, resulting in a higher similarity (Burt, 2000). Moreover, stronger relationships are considered as more trustful, resulting in a higher chance to express feelings, attitudes, and perceptions. The idea behind this is that people are more likely to be themselves (Wheeler & Miyake, 1992), and share more candid opinions with people they trust (Gibbons, 2004; McPherson, Smith-Lovin, & Cook, 2001). In the case of burnout, this means that teachers will be more likely to share feelings of burnout in strong(er), more trustworthy relationships. As a consequence, these relationships are characterised by a higher level of burnout exposure, potentially resulting in a higher level of similarity. Moreover, based on social comparison theory (Festinger, 1954), it can be argued that trustful interaction partners are regarded as more credible or relevant (Ibarra & Andrews, 1993). The feelings and perceptions of trustful interaction partners, with whom one has a strong relationship, are not only more available, they are also regarded as more trustworthy. In line with this, Rice (1993) indicated that feelings, attitudes, and perceptions are mostly shaped by these of relevant or salient others. Floyd, Borgatti, and Soltis (2013) indicated that interpersonal proximity cannot be neglected when investigating processes of social contagion. In other words, to assess the extent to which burnout feelings

are shared among interaction partners, it is crucial to include these features of a relationship as they define contagion processes. Based on a wide range of network studies, *three important relational features*, that provide information on the interpersonal proximity, are addressed, namely multiplexity, frequency, and embeddedness of relationships.

A first feature, is the multiplexity of a relationship. A multiplex relationship can be described as a relationship between two teachers that serves multiple interests and is characterised by instrumental and expressive interactions. Multiplex relationships are suggested to be stronger and more trustful relationships than relationships that only have one single purpose (Moolenaar, 2012). In the context of this study, we address the question if a relationship, characterised by both instrumental and expressive interactions, results in more similar feelings of burnout. In line with hypothesis 3, it is expected that when the relationship with the same interaction partner entails both conscious and unconscious processes, contagion will be stronger. As such, a multiplex tie will be positively related to burnout contagion. However, it is important to note an important difference between hypothesis 3 and 4. In hypothesis 3 the interest lies in the combination of the exposure to different types of conduits regardless of the interaction partner. An individual might have expressive interactions with one colleague and instrumental interactions with another and exposure to both is likely to lead to more burnout contagion than exposure to one type of interaction in the workplace (e.g. some teachers may choose not to discuss any emotional issues with any of the colleagues). With regard to hypothesis 4, multiplexity is a characteristic of the relationship with the same colleague, a relationship is considered multiplex when a teacher has both instrumental as well expressive interactions with the same colleague, hence it is considered a feature of the relationship between the teacher and a specific interaction partner.

H4: *Multiplexity of a relationship is positively related to burnout contagion*

A second relational feature that, according to the literature, reflects interpersonal proximity is the *frequency* of interactions. Often, relationships that are characterised by frequent interactions are thought to be stronger, and as a result more trustful (Granovetter, 1973;

Marsden & Friedkin, 1993). Moreover, frequent interactions imply more chances of being exposed, or more frequent exposure, to others' feelings of burnout (Bakker & Schaufeli, 2000). This study therefore explores if, and to what extent, the frequency of interactions is related to similarity of feelings of burnout.

H5: Frequency of a relationship is positively related to burnout contagion

The third feature of relational strength that is included in this study is the *embeddedness* of a relation in the broader social structure. Krackhardt (1992) indicated that the strength of a relation is, to some extent, a function of the broader social structure around it. Embeddedness can then be defined as the extent to which two individuals are connected to similar third parties (Krackhardt, 1998). In other words, embeddedness reflects the extent to which a relationship is part of a cohesive social neighbourhood or subgroup. Relationships that are characterised by embeddedness are regarded as stronger and more likely to increase trust among actors (Ferrin, Dirks, & Shah, 2006; Totterdell et. al., 2004). Moreover, interactions embedded in a cohesive social structure are likely to facilitate the development of generally shared feelings and perceptions among individuals (Coleman, 1988; Ibarra & Andrews, 1993; Krackhardt, 1998). Based on these arguments, this study evaluates if embedded relationships result in a higher similarity of burnout feelings.

H6: The embeddedness of a relation is positively related to burnout contagion

Long Term Effects of Burnout Exposure

The second aim of this study is to investigate if burnout contagion has long-term effects on teachers' level of burnout. Studies focusing on the contagion of burnout are usually cross-sectional in nature and rarely address the long-term effects of burnout contagion. The question rises if similarity of burnout feelings at one time is related to an increase in the burnout level of a teacher, two years later. Previous studies have indicated that individuals who report high levels of burnout, often report higher levels at a later point in time, irrespective of the time interval between the two measurement moments (Lee & Ashforth, 1993; Leiter & Durup, 1996;

Toppinen-Tanner, Kalimon, & Mutanen, 2002). As such, it expected that burnout contagion has long term-effects.

H7: Burnout contagion has a long-term effect on feelings of burnout

Earlier research has shown that burnout consists of three related but empirically distinct components (Bakker, Schaufeli, Sixma, Bosveld & Van Dierendonck, 2000; Cordes & Dougherty, 1993), namely emotional exhaustion, depersonalization, and personal accomplishment. As such, the hypotheses will be tested separately for each component. However, given that all three components give rise to the syndrome of burnout, the same relationships and effects are expected for all three components, hence the hypotheses above were not differentiated per component.

Methods

Procedure and Respondents

The data for this study were collected in 2014 in 20 secondary schools in Flanders. These schools are a subsample of the larger project that studies student careers in secondary education. All school team members were invited to participate in an online survey entitled 'the school team questionnaire'. In total, 14 schools reached a response rate of 75%, which is the typically required threshold for network studies (Borgatti, Carley, & Krackhardt, 2006; Kossinets, 2006). Six schools did not achieve the required response rate of 75% ($M = 54.93\%$, $SD = 13.95$) and were excluded from the dataset. The average response rate across our included schools was 87.71%. The smallest school had 37 participating teachers and the largest 143. In total, the data at T1 concerned 931 secondary teachers. To test the long-term effect of burnout exposure, data on burnout were collected in 2016, 2 years later in 12 of the 14 schools that participated in the first wave. In total, data of 578 teachers could be used for the longitudinal analyses.

Measures

Burnout. To retrieve information on the level of burnout of teachers, we used an adapted version of the Dutch Maslach Burnout Inventory for teachers (Schaufeli & Van Dierendonck, 2000). The scale addressed the three dimensions of burnout, namely emotional exhaustion, depersonalization, and personal accomplishment. For emotional exhaustion eight items were included, for instance: “At the end of the school day, I feel empty”, and “I feel emotionally drained by my work”. Depersonalization was addressed by five items such as “I really don’t care about what happens to some of my students”, and “I’m afraid this job is making me uncaring”. Finally, personal accomplishment was measured by seven items, for example “I accomplish many worthwhile things in this job”, and “I look after my students’ problems very effectively”. Each of these items had to be evaluated on a 6-point Likert scale going from “completely agree” to “completely not agree”. The three-factor structure was confirmed in a confirmatory factor analysis (CFA) ($\chi^2/df = 1.08$, CFI = .91, TLI = .90, RMSEA = .07, SRMR = .05). The Cronbach’s alpha’s of the emotional exhaustion, depersonalization, and personal accomplishment scale were respectively .89, .69, .81.

In the second measurement, the three-factor structure of the burnout construct was also confirmed ($\chi^2/df = 1.18$, CFI = .90, TLI = .88, RMSEA = .07, SRMR = .07). Cronbach’s alpha’s were comparable to those at T1 (emotional exhaustion = .90; depersonalization = .69; personal accomplishment = .83). Longitudinal measurement invariance was tested to determine whether items of a particular scale assess the same concept across time (Meredith, 1993). As prescribed by Vandenberg and Lance (2000), a series of nested models were run to test configural invariance, metric invariance and scalar invariance. The most widely used and best supported criterion for invariance is the difference in comparative fit index (ΔCFI) especially when the sample size is rather large (Chen, 2007; Cheung, & Rensvold, 2002). All ΔCFI values were below the threshold of $< .01$, indicating longitudinal measurement invariance.

Interpersonal relationships and their features. In order to determine who teachers

were connected to, two types of interactions were assessed. Instrumental interactions were measured by the following question: “*Whom do you go to for class-related information (such as information on learning content, teaching aids, teaching methods and classroom management)?*”. In order to retrieve data on expressive interactions, the following question on personal guidance was asked: “*Whom do you go to for guidance on more personal matters?*”. With both questions, a name-roster containing all members of the school was presented and respondents could unlimitedly indicate whom of their colleagues they went to. For each of these relationships, respondents could indicate on what *frequency* basis (presented in 8 categories going from ‘once a year’ to ‘daily’) they went to this person. *Multiplexity* was measured by adding up the binary scores of the instrumental and expressive network. Finally, the *embeddedness* of a relationship was operationalized and measured by means of the Simmelian strength. Krackhardt (1998) defined a Simmelian tie strength as follows: “*Two people are ‘Simmelian tied to one another if they are reciprocally and strongly tied to each other and if they have at least one third part in common*” (p. 186). The more two actors were jointly connected to third parties, the higher the Simmelian strength of the relationship.

Demographic variables. Finally, teachers were also asked to indicate their gender, age, years of experience in education and hours working in the school. These demographics were selected as control variables based on previous studies that focused on burnout prevalence (e.g., Grayson & Alvarez, 2008; Lau, Yuen, & Chan, 2005; Van Droogenbroeck, Spruyt, & Vanroelen, 2014).

Analytic Approach

A basic assumption of a social network approach is that individuals are influenced by the people they are connected to (Marsden & Friedkin, 1993). However, this process of similarity, or contagion, cannot simply be modelled using standard regression or multilevel methods as the classic statistical assumption of data independence is violated. HLM measures social interdependence in a single, simple way; as co-membership within the same nested

exogenous structure (i.e., teachers within the same school). HLM thus broadly accounts for the degree to which teachers are similar by virtue of this comembership. This is the only way it accounts for interdependence. However, HLM is not suitable for analysing network data focusing on relationships among actors. Statistical models for social networks, by contrast, measure relational interdependence in multiple ways, simultaneously, including but not only co-membership. Social network analysis (SNA) thus accounts for the nesting of individuals in school but is also able to test a set of principled and testable assumptions about network ties dependence, referring to social forces such as dyadic cohesion, reciprocity, transitivity, brokerage, homophily, etc. These models test the possibility that transmission/contagion of burnout and social outcomes could obey a range of possible social configurations (not just general co-membership). As such, these additional network effects are essential to untangling the many possible person-to-person effect(s) on burnout, which is the aim of our paper. More specifically, a teacher's burnout level is no longer assumed to be statistically independent, but dependent from others level of burnout (O'Malley & Marsden, 2008). In sum, network models explicitly model the interdependence within the schools while traditional multilevel models only account for the nesting of the teachers within schools. As such, traditional multilevel models are not suitable for analysing social network data.

Recently, multilevel social network models gained more attention in the literature. However, these models should not be confused with multilevel regression models. Multilevel social network models are not designed to account for nesting like traditional multilevel models as this interdependence is already modelled in (non-multilevel) social network analyses. Rather these models are designed to analyse ties across levels and at level-2. Cross-level ties in this study refer to the tie between a teacher and the school and considering cross-level ties is only valuable when there are multiple memberships, in other words if teachers are teaching in more than one school. Level-2 ties in this study refer to connections among schools, for example a formal partnership or collaboration at the school level. Since our teachers did not have multiple memberships (they were only active in one school) and there

was no indication that ties between schools at the school level were relevant for burnout contagion, cross-level ties and between-schools ties (level-2) did not have to be modelled. As such there was no need for a multilevel social network approach (Lomi, Robins, & Tranner, 2016).

In order to measure and estimate the similarity of alters' burnout levels, a specific class of models, known as network autocorrelation models (NAM) were used (Doreian, Teuter, & Wang, 1984; Leenders, 2002). These models allow estimating the influence of alters' burnout on an individual's level of burnout. However, actors are often connected to multiple interaction partners. Within these models, the influence of interaction partners is not regarded as cumulative, but rather as different, heterogeneous influences that are combined into an average level of burnout, taking the number of interaction partners into account (Floyd, Borgatti, & Soltis, 2013; Leenders, 2002; Siciliano, 2016). Based on the strength (indicated by multiplexity, frequency or embeddedness), each relationship can then be weighted. The idea behind this is that stronger relationships have a larger share in the average level of burnout a teacher is exposed to. In this way, the strength of the relationship is considered. In order to test hypotheses 1 to 6, different cross-sectional network autocorrelation models were calculated. In all of these models, gender, tenure and the hours working in the school are added as control variables. Hypothesis 7 was assessed using temporal network autocorrelation models. Next to gender, tenure and the hours working in the school (measured at T2), also burnout at time 1 (T1) was added as a control variable. Both the cross-sectional and longitudinal models were analysed with the recently developed R package TNAM (Leifeld, Cranmer, & Desmarais, 2016). In all of these models, a positive effect indicated that there was a statistically significant similarity between the teacher's level of burnout and the interaction partners their level of burnout.

Missing Data

Due to the 75% response rate threshold, missing data within schools was not a major issue.

Overall, 11 % of the teachers was completely missing. For these teachers, we did not have information on demographics, burnout and the interactions they sent out. However, information on the interactions they received, could be retrieved from the respondents. In order to check for potential nonresponse bias, respondents and non-respondents were compared regarding the number of times they were nominated by respondents. More specifically, we evaluated the number of ties both groups received in the information and personal guidance network by means of t-tests. The results of the t-test revealed no significant differences between respondents and non-respondents in our 14 schools, which indicates we have no reason to believe that these missing data were not missing at random (MAR).

Finally, due to a technical problem with the online survey, 16 teachers (1.5% of the total dataset) had one or multiple items missing in the burnout scale. For these incomplete observations, missing values were multiply imputed using chained equations, under a missing at random (RAM) assumption (Azur, Stuart, Frangakis, & Leaf, 2011). The imputation was performed using the MICE package in R (van Buuren et al., 2015). The data were imputed five times and subsequent analyses were performed on each imputed dataset and combined using Rubin's (1987) rules.

Results

Contagion of Burnout: Cross-sectional Approach

Descriptive statistics of the control and burnout variables are presented in Table 1. For each variable, mean, standard deviation and correlations were calculated. On average, our teachers had 12.5 years of experience in the school ($SD = 9.96$) and worked 16.79 hours as a teacher in the school ($SD = 5.85$). On a scale of six, teachers scored an average of 2.68 on emotional exhaustion, 2.10 on depersonalisation and 4.40 on personal accomplishment. Tenure was significantly correlated with emotional exhaustion ($r = -.11, p > .001$) and personal accomplishment ($r = .11, p > .001$). This indicated that teachers with less years of experience in the school felt slightly less emotionally exhausted and had higher feelings of personal

accomplishment. Results also show that the three dimensions of burnout were moderately correlated, supporting the idea of three distinct components that belong to the same syndrome. Finally, three ANOVA analyses were executed to see whether average burnout scores differed across the different participating schools at T1. For both emotional exhaustion and depersonalisation, no significant differences were found (respectively, $F(1,13) = 1.45$, $p = .13$, $\eta^2 = .02$ and $F(1,13) = 1.52$, $p = .103$, $\eta^2 = .02$). For personal accomplishment, differences were identified ($F(1,13) = 4.79$, $p < .01$, $\eta^2 = .06$). Further post-hoc Tukey analyses revealed that one school scored significantly lower than most of other schools. However, as mentioned, this does not impact on the results regarding burnout contagion as interdependence (such as co-membership) are explicitly modelled in social network analyses.

The first three hypotheses stated that (1) burnout is contagious through interpersonal interaction, (2) that this contagion is stronger in expressive ties than in instrumental ties and (3) stronger when both types of ties are present. Therefore, it was explored if teachers' level of burnout is related to the level of burnout among interaction partners, or alters, in the information network (Model 1), alters in the personal guidance network (Model 2), or all alters of both types of networks (Model 3). In order to check for the overlap between the instrumental and expressive network, QAP (Quadratic Assignment Procedure) – correlations were calculated. This procedure made it possible to evaluate the extent to which actors address similar alters for different types of interactions (Borgatti, Johnson, & Everett, 2013). The QAP-correlation between the information and personal guidance network was on average .334 ($SD = .056$). This indicated that 33% of the relations occur in both networks. This medium overlap showed that teachers address, to some extent, different alters for information and personal guidance, providing evidence for the distinction between instrumental and expressive ties. The results of the Network Autocorrelation Models (NAM) for emotional exhaustion, depersonalisation, and personal accomplishment can respectively be found in Tables 2, 3, and 4. For emotional exhaustion, no significant effect in model 1 and 2 was found. This showed that the level of emotional exhaustion (Table 2) of interaction partners in the information

network (Model 1: $\rho = .11$) or personal guidance (Model 2: $\rho = .03$) network was not significantly related to a teacher's level of emotional exhaustion. However, the combination of both types of interactions in an overlapping network resulted in a statistical significant similarity of emotional exhaustion among interaction partners (Model 3: $\rho = .18, p < .05$). This result showed that contagion of emotional exhaustion takes place in the combination of both expressive and instrumental relationships. For depersonalisation (Table 3), similar results were found. Contagion did not occur in the information (Model 1: $\rho = .10$) or personal guidance network (Model 2: $\rho = -.01$) alone but did occur in the combination of both (Model 3: $\rho = .16, p < .05$). As such, for emotional exhaustion and depersonalisation hypothesis 1 and 3 were confirmed, but no evidence was found for hypothesis 2. However, for personal accomplishment (Table 4), there was no significant relationship between a teacher's level and the level of personal accomplishment among connected colleagues, as such neither hypothesis 1, 2 or 3 was confirmed. The estimate of contagion of personal accomplishment was not significant in the information network (Model 1: $\rho = .05$), personal guidance network (Model 2: $\rho = .02$) or the combination of both (Model 3: $\rho = .04$).

In order to investigate if, and to what extent, burnout contagion is defined by different measures of tie strength, three additional models were run. The results for multiplexity (H4) can be found in model 4, for frequency (H5) in model 5, and embeddedness (H6) in model 6. Model 4, measuring the strength of a relationship by weighting relationships that are both instrumental and expressive double, supports partly the hypothesis (H4) that multiplexity of a relationship is positively related to burnout contagion. More specifically, a positive association was found between the multiplexity of a relationship and both emotional exhaustion (Table 2: $\rho = .20, p < .05$) and depersonalisation (Table 3: $\rho = .17, p < .05$), but not for personal accomplishment (Table 4: $\rho = .04$). Although model 4 has a different take than model 3 by including only the ties that are characterised by both instrumental and expressive interactions, the results are comparable. This can be explained by the fact that many of the ties in our dataset exchange both work- and personal-related resources. While a QAP-correlation of .334

can be considered as low enough to make a differentiation between an instrumental and expressive network, this overlap needs to be recognized. Also, the limited weight that was assigned to multiplex relationships could explain the similarity of the results of Model 3 and 4.

In model 5, relationships were weighted by the frequency of the interactions. For emotional exhaustion (Table 2: $\rho = .22$, $p < .05$) and depersonalisation (Table 3: $\rho = .24$, $p < .05$), a significant effect was found. This showed that teachers' level of emotional exhaustion and depersonalisation is more strongly related to their colleagues' levels, when frequency is considered. In other words, hypothesis 5 is partly supported when more weight is given to colleagues with whom a teacher interacts more frequently, a higher contagion effect can be found. No significant results were found for personal accomplishment, reflecting the absence of shared feelings through direct interactions weighted by frequency (Table 4: $\rho = .00$). Thirdly, the defining role of Simmelian strength of a relationship was assessed. For emotional exhaustion (Table 2: $\rho = .07$) and depersonalisation (Table 3: $\rho = .01$), no significant contagion effects were found. For these two components of burnout, hypothesis 6 was not supported. However, for personal accomplishment, a small significant effect was found for the overlapping network weighted by Simmelian strength (Table 4: $\rho = .15$, $p < .05$). In line with hypothesis 6, this showed that when more weight is given to embedded relations, a small, significant relation between teachers' level of personal accomplishment and the level of personal accomplishment of their interaction partners was found.

Burnout Contagion Long-term Effects

Finally, this study wanted to address the long-term effects of burnout contagion. In line with the cross-sectional approach, descriptive statistics were first calculated. In Table 5, the means, standard deviations and correlations of our control and burnout variables at T2 are presented. In line with T1, we found a significant correlation between tenure and personal accomplishment, and the three components of burnout were moderately correlated.

The results of the temporal network autocorrelation models on emotional exhaustion,

depersonalisation, and personal accomplishment can respectively be found in Tables 6, 7, and 8. Based on the results of the cross-sectional NAM, only the effect of the overlapping network weighted by multiplexity, frequency, and Simmelian strength was included. Again hypothesis 7 was partly supported: For emotional exhaustion, long-term effects for burnout contagion, weighted by multiplexity (Table 6: $\rho = .24, p < .05$) and frequency (Table 6: $\rho = .26, p < .05$), were found, even when controlling for emotional exhaustion at T1. For depersonalisation (Table 7), the results did not indicate significant long-term effects. Finally, for personal accomplishment, a small long-term effect for Simmelian strength was found (Table 8: $\rho = .04, p < .05$).

General Discussion

The current study set out to unravel the process of burnout contagion. While interpersonal interactions have often been proposed as the mechanism through which convergence of emotions occurs, actual empirically evidence was lacking. Moreover, little is known about the type of interactions and features of the relationship that play a role in this process.

This study indeed demonstrated that burnout is – to some extent – contagious and that this contagion occurs through interpersonal interaction. Moreover, the characteristics of these social relationships matter as they relate to the strength of the contagion process, however, differential effects were found for the different components of burnout. Finally, findings show that contagion that occurs through interpersonal interaction has long-term effects on individuals' levels of burnout. Below the main theoretical contributions and practical implications as well as the limitations of the current study are discussed.

Theoretical Contributions

The contributions of the current study are situated in three areas. First, by examining empirically if burnout contagion occurs through interpersonal interaction, the current study disentangles an important aspect of the mechanism behind burnout contagion. Second, more

insight into differences among interpersonal relations and their role for burnout contagion is gained. Third, long-term effects of burnout contagion are assessed.

The first contribution of the study is the premise that burnout contagion occurs through interpersonal interactions as such it provides insight into the mechanism behind the convergence of emotions. A social network approach provides a valuable lens to investigate to what extent individual's feelings, attitudes, and perceptions are shaped by the social structure (Siciliano, 2016). By applying this approach, this study went beyond the level of the individual and took actual social relationships and their strength into account. In this way, this study made a unique contribution to the investigation of burnout contagion, as previous studies did not take this social structure into account. Specifically, it helped to understand the interactions through which feelings of emotional exhaustion, depersonalisation, and personal accomplishment are exposed and transferred. However, teachers often interact with multiple colleagues, and, as a result, are exposed to a set of alters with different levels of burnout. The influence of interaction partners was not seen as cumulative, but as different influences that are combined into an average level of burnout among alters (Leenders, 2002). Based on the cross-sectional network autocorrelation models, it was found that teachers' level of burn-out, was, to some extent, related to the level of their interaction partners.

Secondly, this study provides insight in the features of the relationships that play a defining role in this contagion process. As such, it is among the first studies taking differences in the interpersonal context into account when examining burnout. More specifically, results show that feelings of burn-out are more contagious when interacting with specific alters, namely colleagues with whom one has a stronger relationship. This is in line with earlier literature on emotional contagion that has stated that strongly connected alters play a more significant role in the creation of shared feelings, than less strong connected alters (Rice, 1993). The assumption is that stronger relationships are characterised by trust and individuals tend to be more themselves with colleagues they trust more (Gibbons, 2004; McPherson et al., 2001). Our hypotheses and analyses focused on person-to-person effects and are thus

technically situated at the dyadic level. However, an individual is affected by all its connections at the same time, making it impossible to justify that the effects are solely situated at the dyadic level. It is therefore important to recognise that it is simultaneously a network effect.

An interesting and novel finding is that the defining role of different relational characteristics differed between components. In the case of emotional exhaustion and depersonalisation, especially the strength in terms of direct interactions resulted in contagion. Previous studies indicated that negative emotions are more contagious through direct interaction in comparison to positive feelings (Barsade, 2002; Chen et al., 2015). This is in line with the assumption that strongly related interaction partners are more likely to discuss intense and emotionally charged topics (Haggard, Robert, & Rose, 2011). In addition, within these strong, direct relationships, the risk of co-rumination, namely excessive negative chatter on one topic, is more present than in other, less strong relationships. While some scholars indicated that discussing (work-related) problems, such as emotional exhaustion and depersonalisation, can create the feeling of being socially supported and inhibit feelings of burnout (Russel, Altmaier, & Van Velzen, 1987). Others have provided evidence for the opposite, namely that co-rumination can result in increased levels of burnout exposure as it focuses on negative feelings and issues of particular salience (Boren, 2013).

For feelings of personal accomplishment, the embeddedness of the relationship played a defining role. This could be an indication that interaction partners share more feelings of personal accomplishment when their relation is embedded within a broader social structure. Based on Krackhardt (1999), a potential explanation could therefore be that embedded ties facilitate the development of a broader culture of accomplishment, resulting in a higher exposure of a culture of personal accomplishment. In educational research, this is often referred to as collective efficacy (Goddard, Hoy, & Hoy, 2004). Social comparison theory stated that alters are used as valid points of reference to examine own attitudes, opinions, and behaviours (Festinger, 1954). When a teacher is surrounded by colleagues with high levels of personal accomplishment, and the corresponding success stories, they might feel more

competent themselves.

Finally, the third contribution of the study is that it demonstrated that burnout contagion has long-term effects. The level of emotional exhaustion among alters was related to a teacher's level of emotional exhaustion two years later. Being exposed to high levels of emotional exhaustion had long-term effects, even two years later. Again, the direct tie strength, namely multiplexity and frequency, played a defining role. This finding stresses the long-term effect of exposure and the need to pay attention to the development of shared feelings among interaction partners. Also, for personal accomplishment the cross-sectional results were confirmed in the longitudinal analysis; a small long-term effect was found when ties were weighted for Simmelian strength.

Practical Implications

The findings of this study showed that feelings of burnout are to some extent contagious. namely that interaction partners share feelings of burn-out. Moreover, for feelings of emotional exhaustion and personal accomplishment, a long-term effect of contagion was found. This study thus demonstrated the importance of considering burnout not solely as an individual syndrome but also acknowledge the role of the interpersonal context. One of the key assumptions of a social network approach – the fact that the social structure shapes individual's behaviour, attitudes, and emotions – also holds for burnout. In line with the earlier suggestion of Bakker and Schaufeli (2000), this study provided evidence for the potential benefits of interventions at team and organisational level, rather than solely on the individual level. These interventions could for instance focus on the interpersonal dynamics within the school. Obviously, knowledge on the social structure of a school can aid the identification of interactions, the strength of these interactions, and characteristics of the interaction partners.

Results of this study support the observation of Westman et al. (2011) that stimulating prosocial behaviour in organisations is a double-edged sword. This study adds that especially in strong and embedded relationships one needs to be aware of the potential negative impact

of social relationships. As such, we concur with Westman and colleagues (2011) in advising that interventions for preventing and reducing burnout should not solely focus on increasing social support within the school team; external support might be necessary to break a potential negative cycle within the school team. However, this does not mean that internal social support should be avoided. Many studies have demonstrated the positive aspects of social relations within school teams. For example, Moolenaar, Daly, and Sleegers (2011) stress the importance of social relationships for school innovation, professional development, and, in the end, for increasing student achievement. Struyve and colleagues (2016) found that the more teachers are embedded in the web of social relationships within the school, the more they feel affectively committed to the school and satisfied with their job. However, and secondly, co-rumination within the school team should be avoided as it negatively impacts employees' well-being in the short and long run. The exchange of positive (social) experiences within the school team should also be stimulated as prior research has argued that positive experiences and feelings are also contagious (Chen et al., 2015).

Limitations and Suggestions for Future Research

Next to the contributions of this study, limitations should be noted as well. A critique that previous studies on burnout contagion had to deal with is that feelings of burnout are clustered among interaction partners because they are subject to similar demanding contextual features, such as workload or detrimental interactions with the same students (Bakker & Schaufeli, 2000). It cannot be ruled out that some interaction partners, who have stronger ties, have similar levels of burnout due to comparable contextual demands. It should be noted that this study solely focused on comprehending the extent to which interaction partners develop more similar feelings of burnout through interactions. The goal of the study was to focus on burnout contagion by means of a social network approach. The results indicate that (stronger) interactions with colleagues play a role in teachers' burnout level. Future research could examine these findings while taking work-related factors into account that have been

associated with teacher burnout, such as excessive time pressure, large classes, lack of resources, fear of violence, behavioural problems of pupils, etc. (e.g., Hakanen, Bakker, & Schaufeli, 2006; Pas, Bradshaw, & Hershfeldt, 2012).

A second limitation concerns the nature of our network data. It should be noted that several models were of cross-sectional nature. These models rather presented the result of (ongoing) contagion processes (Daraganova & Robins, 2013). In other words, a significant effect provided evidence that burnout contagion had taken/is taking place, and feelings are currently, to some extent, shared. However, due to the cross-sectional nature, these conclusions should be made with caution. Although long-term effects could be modelled using our longitudinal data on burnout and temporal network autocorrelation models, it is impossible to completely rule out social selection as the reason for significant findings (Shalizi & Thomas, 2010). However, there are good reasons to believe that the findings of this study capture, to some extent, social contagion processes, rather than social selection processes. The latter would indicate that teachers with similar burnout levels form ties, due to their similarity. However, the selection of similar others, often referred to as the homophily effect, is often based on more salient attributes (De Klepper, Sleebos, van de Bunt, & Agneessens, 2010; McPherson et al., 2001). People tend to share feelings and attitudes on sensitive issues at work cautiously (McPherson et al., 2001). Based on these arguments, it seems less likely that interaction partners were all selected based on these features. Future research could address these social selection and influence processes by means of longitudinal data on both networks and burnout. The study of Kalish et al. (2015), examining stress levels, demonstrated that network evolutions affect levels of burnout, but also that network structure is affected by individuals' burnout. Using this approach, more causal claims on the relation between an individual and alters' burnout can be made. Beyond disentangling selection and influence processes, longitudinal network data would also make it possible to identify if fluctuations in teacher burnout is due to changes in the network structure.

Thirdly, contagion was treated as an unidirectional process in the sense that

directionality of ties or contagion was considered. This was based on the idea that interaction partners their feelings or attitudes become more similar through any interaction and contaminate each other (Leenders, 1997). However, it would be interesting to further look into the directionality of contagion and make a distinction between sent and received ties. Finally, the idea that feelings of burnout are shared more in specific relations, was mostly based on the idea that stronger relations are characterised by trust. It would be interesting for future research to include this trust, to further comprehend to what extent this relational feature affects the contagion of burnout.

Conclusion

Our study provided a first exploration of the similarity of feelings of emotional exhaustion, depersonalisation, and personal accomplishment among social interaction partners. It showed the importance of investigating the occurrence of burnout within the social context, instead of focusing on the individual in isolation. There is a need to investigate the functioning of teachers, and other employees, from an interactionist perspective, rather than treating these individuals as islands that are unaffected by the daily interactions. Moreover, our findings indicated that individuals who are strongly connected to others, develop more similar feelings and attitudes. Therefore, this study is a plea to go beyond descriptive measures such as the quantity of ties, and to take features of the interaction and alters itself into account. In line with Siciliano (2016), it is argued that it's not only the quantity of ties that matter, but also the quality.

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Tables

Table 1

Descriptive statistics T1

	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.
1. Gender	1.66	.47					
2. Tenure	12.50	9.96	.02				
3. Hours	16.79	5.85	-.11***	-.04			
4. Emotional exhaustion	2.68	.90	-.01	.11***	.03		
5. Depersonalisation	2.10	.65	-.09**	.02	-.01	.59***	
6. Personal accomplishment	4.40	.55	-.02	-.11***	.08*	-.38***	-.51***

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

Table 2

Cross-sectional autocorrelation models: Emotional exhaustion

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	2.29 (.17)***	2.54 (.15)***	2.11 (.23)***	2.09 (.2)***	2.02 (.22)***	2.41 (.17)***
<i>Control Variables</i>						
Gender	-.03 (.06)	-.02 (.07)	-.02 (.06)	-.02 (.06)	-.03 (.06)	-.03 (.06)
Tenure	.01 (.00)***	.01 (.00)***	.01 (.00)**	.01 (.00)***	.01 (.00)**	.01 (.00)***
Hours	.00 (.06)	.00 (.03)	.00 (.07)	.00 (.07)	-.00 (.07)	-.00 (.01)
Information network	.11 (.62)					
Personal guidance network		.03 (.03)				
Overlapping network			.18 (.07)*			
Overlapping network: Multiplexity				.20 (.07)*		
Overlapping network: Frequency					.22 (.07)**	
Overlapping network: Simmelian Strength						.07 (.05)

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

Table 3

Cross-sectional autocorrelation models: Depersonalisation

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	2.07 (.13)***	2.30 (.11)***	1.96 (.18)***	1.95 (.18)***	1.79 (.18)***	2.27 (.13)***
<i>Control variables</i>						
Gender	-.12 (.04)**	-.12 (.04)**	-.11 (.04)*	-.11 (.04)**	-.11 (.04)**	-.12 (.04)**
Tenure	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)
Hours	-.00 (.00)	-.00 (.00)	-.00 (.00)	-.00 (.00)	-.00 (.00)	-.00 (.00)
Information network	.10 (.06)					
Personal guidance network		-.01 (.03)				
Overlapping network			.16 (.08)*			
Overlapping network: Multiplexity				.17 (.08)*		
Overlapping network: Frequency					.24 (.08)**	
Overlapping network: Simmelian Strength						.01 (.05)

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

Table 4

Cross-sectional autocorrelation models: Personal accomplishment

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	4.32 (.19)***	4.5 (.10)***	4.39 (.23)***	4.36 (.23)***	4.55 (.25)***	4.35 (.13)***
<i>Control variables</i>						
Gender	-.02 (.04)	-.02 (.04)	-.02 (.04)	-.02 (.04)	-.02 (.04)	-.02 (.04)
Tenure	-.01 (00)***	-.01 (00)***	-.01 (00)***	-.01 (00)***	-.01 (00)***	-.01 (00)***
Hours	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)
Information network	.05 (.04)					
Personal guidance network		.02 (.01)				
Overlapping network			.04 (.05)			
Overlapping network: Multiplexity				.04 (.05)		
Overlapping network: Frequency					.00 (.05)	
Overlapping network: Simmelian Strength						.15 (.02)*

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

Table 5

Descriptive statistics T2

	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.
1. Gender	1.66	.47					
2. Tenure	14.83	9.48	.03				
3. Hours	18.99	4.89	-.23***	-.15***			
4. Emotional exhaustion	2.79	.99	.01	.07	.04		
5. Depersonalisation	2.07	.66	-.04	.00	.04	.51***	
6. Personal accomplishment	4.46	.57	-.05	-.13**	.08	-.44***	-.53***

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

Table 6

Temporal network autocorrelation models: emotional exhaustion

	Model 7	Model 8	Model 9
Intercept	.14 (.32)	.10 (.34)	.42 (.28)
Gender	-.00 (.06)	-.00 (.06)	-.00 (.07)
Tenure (T2)	-.00 (.00)	-.00 (.00)	-.00 (.00)
Hours (T2)	.01 (.01)	.01 (.01)	.01 (.01)
Emotional Exhaustion (T1)	.72 (.04)***	.72 (.04)***	.72 (.04)***
Overlapping network: Multiplexity (T1)	.24 (.10)*		
Overlapping network: Frequency (T1)		.26 (.10)*	
Overlapping network: Simmelian Strength (T1)			.12 (.07)

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

Table 7

Temporal network autocorrelation models: depersonalisation

	Model 7	Model 8	Model 9
Intercept	.54 (.28)	.39 (.28)	.76 (.23)
Gender	.00 (.05)	.00 (.05)	.00 (.05)
Tenure (T2)	-.00 (.00)	-.00 (.00)	-.00 (.00)
Hours (T2)	.01 (.01)	.01 (.01)	.01 (.01)
Depersonalisation (T1)	.58 (.04)***	.58 (.04)***	.59 (.04)***
Overlapping network: Multiplexity (T1)	.12 (.11)		
Overlapping network: Frequency (T1)		.19 (.11)	
Overlapping network: Simmelian Strength (T1)			.01 (.08)

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

Table 8

Temporal network autocorrelation models: personal accomplishment

	Model 7	Model 8	Model 9
Intercept	1.32 (.36) ^{***}	.73 (.46)	1.25(.25) ^{***}
Gender	-.03 (.04)	-.04 (.04)	-.04 (.04)
Tenure (T2)	-.00 (.00)	-.00 (.00)	-.00 (.00)
Hours (T2)	-.00 (.00)	-.00 (.00)	-.00 (.00)
Personal accomplishment (T1)	.69 (.04) ^{***}	.69 (.04) ^{***}	.69 (.04) ^{***}
Overlapping network: Multiplexity (T1)	.04 (.07)		
Overlapping network: Frequency (T1)		.18 (.09)	
Overlapping network: Simmelian Strength (T1)			.04 (.02) [*]

Note: ^{***} $p < .001$, ^{**} $p < .01$, ^{*} $p < .05$